PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY

MEETING OF OCTOBER 2, 1956

A regular meeting of the Society was held at the American Museum of Natural History; President Vishniac presiding.

The secretary was instructed to write to Mrs. William P. Comstock, expressing deepest sympathy upon the passing of long-time member and friend, William P. Comstock.

Drs. Treat and Klots reported on the meetings of the International Congress of Entomology, held in Montreal in August. In addition to the scientific value of the Congress, as evidenced by a display of the abstracts of talks, everyone seemed impressed with the excellent planning of the meetings and the pleasant and friendly atmosphere which existed throughout the sessions.

The members of the Society reported on their summer activities. Dr. Klots showed a number of exceptional kodachromes of insects which he had taken during the summer. Another highlight of the discussion was Dr. Schneirla's description of the recently opened Southwest Research Station at Portal, Arizona, which gives convenient access to a wealth of entomological fauna in that area.

The meeting was adjourned at 10:00 P.M.

EDWARD S. HODGSON, *Secretary*

MEETING OF OCTOBER 16, 1956

A regular meeting of the Society was held at the American Museum of Natural History; President Vishniac presiding. Mr. Peter Farb was proposed for membership. The publication and excellent reviews of Mr. Teale's book "Autumn Across America" were announced.

The speaker of the evening was Mr. Melville Osborne, President of the Newark Entomological Society, who discussed "Mass Rearing of Lepidoptera". Mr. Osborne explained his methods of collecting female moths and the artifices used to induce them to mate. The latter range from relatively simple procedures such as temporary isolation to actual surgical techniques, including severing the abdomens and hand-matings. Mr. Osborne explained that even after viable eggs had been obtained the rearing of the caterpillars was subject to a number of hazards, including diseases of the larvae which may kill them en masse. Division of the larval populations into small groups and frequent replacement of food materials reduce the mortality rates from such diseases, and under some conditions, it is also advantageous to raise different species of lepidopterans together, to restrict the spread of species-specific disease.

The talk was followed by a lively discussion period until the meeting adjournment at 10:00 P.M.

EDWARD S. HODGSON, *Secretary*

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FOUR NEW SPECIES OF NEOTROPICAL PENTATOMIDS (HETEROPTERA, PENTATOMIDAE)

By Herbert Ruckes[1]

The following four new species are of interest in so much as each represents a separate Tribe within the Pentatomidae. With the exception of the specimens listed under the name of *Sciocoris crassus,* new species, all examples have been in the collection of the American Museum of Natural History for many years. It is only proper that they be assigned names at this time.

In the descriptions the various numerical ratios given are dimensions measured through a binocular microscope using a $\times 2$ objective and a $\times 9$ ocular filled with a micrometer scale divided into 200 linear units. They are not in terms of millimeters except as specified for the holotypes and allotypes.

I wish to extend my sincere thanks to Mrs. Rose Ismay for typing the manuscript of this article.

Tribe Sciocorini Amyot and Serville

Sciocoris crassus, new species

Oval, moderately convex above, more so below; sordid fulvous; punctures sometimes ferruginous, sometimes fuscous, moderately coarse and moderately dense.

Head slightly declivent, about one-fourth wider through the eyes than long medianly (100×80), its median length equal to the median length of the pronotum (80×80); lateral margins provided with a blunt lobule or small dentation just before each eye, then weakly sinuate to a broadly rounded apex; disc coarsely and regularly punctured, the apical portion between the overlapping juga and tylus weakly impressed; ocelli dull red and twice as far apart as each is from its eye; eyes fuscous. Antennae reddish brown, the apical segment darker; basal segment stouter than the others; segmental ratios: 15/23/13/20/27, i.e., segment III the shortest and subequal to I; segment V the longest.

Pronotum almost rectangular, two and a quarter times as wide across the humeri as long medianly (180×80); humeri very obtusely rounded, not at all produced and grading into the obsolescent posterolateral margins; posterior margin transverse; anterolateral margins with a slight convex curvature; anterior margin shallowly excavated behind the head and then

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truncate behind the eyes; anterior lateral angles obtusely rounded; disc thickish inside the anterolateral margins, the outer surface then sloping gradually to the margins which are subcarinate; a broad but shallow transverse groove across the middle of the disc and ending laterally in enlarged, deeper, subrotund impressions; punctures coarse but shallow.

Scutellum about as wide as long (117 × 113), reaching well behind the middle of the abdomen; each basal angle provided with a minute, fuscous to piceous, calloused spot, followed posteriorly by a small subfoveal impression; a broad basal, vaguely triangular paler area raised slightly above the remaining portion of the disc; surface of the disc slightly convex, giving the impression of thickness; apex broadly rounded; punctures rather evenly distributed and moderately dense. Hemelytra more finely punctured; the apical margin essentially straight and the outer apical angle rectilinear to acute, definitely not obtusely rounded; membrane sordid amber, veins ill-defined, when showing, they are subparallel. Connexivum rather narrowly exposed, the margins thickish; apical segmental angles rectilinear to obtuse and not at all produced, the entire lateral margin continuous; segments alternated sordid fulvous and fuscous, the punctures moderately coarse; apical angle of the sixth segment, obtuse.

Venter quite convex, sordid fulvous or paler with ferruginous and fuscous punctures; thorax coarsely and irregularly punctured; a broad longitudinal fuscous or dark brown band extending each side of the abdominal disc, becoming evanescent posteriorly in the male but completely infuscating the median portion of the sixth sternite in the female; this fuscous band followed laterally by a parallel pale band which in turn is followed laterally by another interrupted and posteriorly evanescent fuscous band; submarginal portion of the abdominal disc pale and finely punctured; segmental incisures bearing marginal small, squarish fuscous patches; spiracles ferruginous; anterior median margin of the sixth abdominal sternite in the male obtusely roundly angled; coxae and trochanters fulvous; femora infuscated beyond the basal two-thirds; tibiae and tarsi concolorous sordid brown to fuscous.

Apical margin of the male genital segment nearly straight, showing little evidence of sinuosity, and subtended medianly by a transverse oval fovea; head of the paramere (clasper) thin, foliaceous and somewhat spoon shaped, lying entirely within the cavity of the segment. Basal plates of the female genital valves setigerous, subtriangular and each about as long as wide at the base.

Described from 10 specimens.

Holotype: Male: 7.5 mm. long; 4.5 mm. wide across the humeri. Tejupilco, Temescaltepec, Mexico. June 29, 1933. H. E. Hinton and R. L. Usinger, collectors. Deposited in the collection of the California Academy of Sciences, San Francisco.

Allotype: Female: 8.0 mm. long; 4.5 mm. wide across the humeri. Same data as above.

Paratypes: Six males and two females. Same data as above

except that one male and one female are deposited in the collection of the American Museum of Natural History.

Unlike either of the two other species of *Sciocoris* (*microphthalmus* Flor and *longifrons* Barber) heretofore recorded from North America. The more reddish tone of the body, its thickness and more robust appearance readily distinguish it. The obtuse angles at the four corners of the pronotum, the obsolescent nature of the posterolateral margins of that part, the longitudinal fuscous banding on the abdominal venter, and ferruginous spiracles are other characteristics that separate this species from the other two mentioned above.

Tribe Discocephalini Fieber

Dinocoris robustus, new species

This is the largest and most robust species of the genus that I have so far encountered. Unfortunately all the available specimens are females. No study of the male genitalia being possible at the present time, the phylogenetic relationship to allied species is doubtful.

Broadly oval, quite convex above and quite flat below; rich fulvous to ochraceous; punctures very coarse and for the most part congested; punctures and bandings dark reddish brown, castaneous or fuscous.

Head shorter medianly than wide through the eyes (110 × 135); lateral margins weakly sinuate and moderately reflexed, converging to a narrowly rounded apex; juga not exceeding the tylus by more than the width of one jugum there and then narrowly overlapping; a single line of dark reddish punctures bordering the vertex laterally and lying adjacent to the ocelli; ocelli bright red and twice as far apart as each is from its eye; eyes fuscous. Antennal tubercles very large, each as big as an eye and totally visible from above; antennae at least three-fourths the length of the body, rich orange brown with the apical third of segment II and the distal halves of segments III and IV piceous; segmental ratios: 70/250/175/150, i.e., antennae four-segmented with segment II the longest, as is typical for the genus.

Pronotum two and two-thirds as wide across the humeri as long medianly (400 × 150); humeri slightly tumid, the angles rectilinear, hardly produced; anterolateral margins mildly sinuate and narrowly reflexed anteriorly; punctures coarse and congested laterally, somewhat more widely spaced centrally; the center ones reddish, the lateral ones castaneous to fuscous; the embossed ochraceous or fulvous portions irregularly reticulate.

Scutellum about one-half longer than wide at the base (340 × 225); basal third gibbous, the crest of this elevation higher than the adjacent surface of the pronotum, very coarsely and deeply pitted with castaneous and

fuscous, basal angles calloused ochraceous; middle third ochraceous with a very few small punctures but with a median line of five or six rotund, very shallow, reddish brown pits; basal half of the distal third, just beyond the point where the frenum ends, provided with two large squarish castaneous, or darker, patches, apical half of this third ochraceous with some shallow coarse punctures; apex narrowly rounded. Hemelytra light ochraceous, provided with a broad band of castaneous, or darker color, across the corium and embolium and continuous with the same colored patches on the scutellum, producing the effect of a very broad dark-colored fascia extending across the middle of the body; additional irregular castaneous or darker patches on the basal portion; membrane hyaline with five subparallel light brown veins. Connexivum alternated, widely exposed, the punctures obsolescent to obsolete; the segmental incisures bordered each side with rich castaneous, broad bands, the intermediate parts bright orange.

Venter essentially concolorous rich orange-brown, impunctate except for a few scattered punctures on and near the acetabula. Evaporatorium castaneous and coarsely rugose; auricle of the metasternal orifice short, finger-like and straight. The second and third (first and second visible) abdominal sternites each provided with a pair of large darker spots, one on each side of the very shallow and broad abdominal furrow; spiracles bordered with reddish brown; each segmental incisure provided with a marginal reddish brown triangular patch. Rostrum relatively long, reaching onto the third abdominal sternite. Legs ochraceous, the femora lightly clouded with brown subapically, the distal ends of the tibiae dark brown; tarsi concolorous ochraceous.

Described from 10 specimens.

Holotype: Female: 18.75 mm. long; 10.2 mm. wide across the humeri. Rio Tapiche, Peru. March, 1928. H. Bassler, collector. Deposited in the American Museum of Natural History.

Paratypes: Eight females, same data as above. One female, Rio Ucayali, Peru. November, 1929. H. Bassler, collector. All deposited in the American Museum of Natural History.

In color pattern this species most nearly approaches *Dinocoris maculatus* (Laporte). The most distinguishing characteristics probably are the over-all larger size and greater dorsal convexity, the contrasting rich ochraceous and castaneous colors, the broad transverse dark band across the middle of the dorsum, the almost concolorus rich orange-brown venter and the femora and tibiae devoid of well-defined fuscous annuli. The least that this new species could be would be a geographical race of *Dinocoris maculatus* in which size has been emphasized and color intensified; it is the author's feeling, however, that it warrants full species status.

Tribe Halyini Stal

Neoadoxoplatys longirostra, new species

Obovate, the greatest body width across the suture between the third and fourth abdominal segments; depressed above, mildly convex below; sordid yellow or tan, punctures fuscous, deep and coarse, somewhat irregularly distributed on the pronotum.

Head almost as long medianly as wide through the eyes (100 × 105); juga and tylus subequal, apex of the head not incised as in related species but moderately rounded; lateral margins sinuate before the eyes and then subparallel; vertex and tylus transversely rugose; parallel bands of congested fuscous punctures extending from the ocelli to the tips of the juga; bases of the juga somewhat impressed just before the eyes, lateral margins very mildly reflexed; eyes brownish red; ocelli bright red, moderate in size and twice as far apart as each is from its eye. Antennae short, barely exceeding the combined length of the head and pronotum, concolorous fulvous, segment I not reaching beyond the apex of the head; segmental ratios: 30/22/40/60/82, i.e., segments II the shortest.

Pronotum three times as wide across the humeri as long medianly (238 × 80) and twice as wide there when measured longitudinally from the anterior lateral angle (238 × 120), i.e., the anterior margin deeply excavated to receive the head up to the eyes; margin behind the eyes somewhat oblique; humeri obtusely rounded, not produced; anterolateral margins essentially straight and weakly reflexed; each anterior lateral angle produced as a small, subrectangular lobe, reaching well beyond the lateral limit of the eye; punctures coarse across the middle of the disc; a band of smaller, congested punctures just inside the anterior margin; a band of well-defined fuscous punctures, uniformly spaced and paralleling the anterior two-thirds of the anterolateral margins; remaining punctures sparingly scattered; posterior margin transverse.

Scutellum somewhat longer than wide at the base (190 × 150), punctures rather regularly distributed but becoming smaller and denser toward the acutely rounded apex; basal angles vaguely calloused sordid yellow. Hemelytra rather regularly punctured, but possessing a triangular, impunctate, discal spot; apical margins very weakly sinuate, the external apical angles rectilinear. Connexivum moderately exposed and moderately punctate, the segmental incisures clouded each side with medium brown; apical segmental angles rectilinear and not exceeding the margin of the abdomen, those on segment VI obtuse.

Venter sordid yellow; base of head and the pleura coarsely punctured with fuscous; abdomen more finely punctured and diffused with testaceous clouding. Mesosternal carina piceous; rostrum long, the apex reaching onto the sixth sternite (male), segmental ratios: 50/20 + 100/120/100, i.e., the second segment and its pseudobase taken together equal to segment III and taken alone equal to segment IV; median abdominal furrow broad and shallow, ill-defined, extending through the fifth sternite. Evaporatorium dark castaneous and irregularly rugose; auricle of the metasternal canal

narrow and evenly curved forward. All segments of the legs concolorous yellow, the ante-apical femoral spines small and fuscous.

Apical margin of the male genital segment trisinuate; the submarginal portion of the segment broadly and deeply impressed; parameres (claspers) extending above the dorsal margin of the segment, the heads carinate on the mesal surfaces and provided with a small subapical notch along the posterior margins.

Described from one specimen.

Holotype: Male: 10.5 mm. long; 5.1 mm. wide across the humeri; 5.4 mm. wide across the widest abdominal portion. Amaya Cispata Bay, Colombia, South America. November 25, 1916. Deposited in the American Museum of Natural History.

Smaller than *Neoadoxoplatys saileri* Kormilev and apparently related to *Neoadoxoplatys haywardi* Kormilev in size and color, but differing from that species by the form of the apex of the head, the presence of lobulate anterior lateral angles on the pronotum, the deeply emarginated pronotal anterior margin, the longer rostrum and the less robust and more strongly curved auricle of the metasternal canal.

Tribe Pentatomini Stal

Oenopiella testacea, new species

Body broadly oval, abdomen somewhat expanded across the second and third segments, the body form, from across the humeral spines to the abdominal apex, subtriangular; background concolorous brick red (testaceous), punctures fuscous, very fine and very dense, those on the hemelytra slightly more wide-spaced; tergum bright orange red.

Head two-thirds the length of the pronotum (60 × 90) and half again as long medianly as wide between the eyes (60 × 40); margins sinuate before the eyes, very obscurely reflexed; apex narrowly rounded; tylus just slightly longer than the juga and weakly elevated; disc somewhat obliquely rugose before the eyes; ocelli red, about four times as far apart as each is from its eye; eyes brownish testaceous. Antennae nearly reaching the apex of the scutellum, segment I not attaining the apex of the head; segments I, II and III fulvous to luteous, their apices narrowly fuscous, segments IV and V fuscous, their bases broadly luteous; segmental proportions: 20/35/32/60/60, i.e., segments II and III, IV and V respectively subequal.

Pronotum roundly excavated anteriorly to receive the head, almost three times as wide across the humeral spines as long medianly (262 × 90); humeri spinately produced laterally and moderately emarginate just behind the spines; anterolateral margins just before the humeral spines acute and weakly trisinuate, then obtusely thickened, slightly tumid, edentate but roughened and terminating at the anterior angles in a minute, oblique denticle; puncturation very fine and very dense except on the cicatrices which are weakly impressed and slightly bronzed; a thin median raised

linea present; posterolateral margins proportionately long, each (including the humeral spine) half as long as the width of the posterior margin which is transversely straight.

Scutellum slightly wider across the base than long (140 × 130), the frenum ending two-thirds the distance from the base; apex moderately rounded; punctures fine and very dense with a very fine transverse rugosity evident on the basal two-thirds; basal angles minutely impressed but not foveolate or calloused. Hemelytra quite broad, the lateral margins distinctly sinuate at the basal third; apical margins essentially straight, the external apical angles roundly acute; punctures more widespaced than those on the pronotum and scutellum and very evenly distributed; membrane transparent, light fulvous with six or seven concolorous veins, one or two of which bifurcate. Connexivum concolorous, narrowly exposed; apical segmental angles rectilinear and very slightly produced; transverse diameter across the second and third segments equal to the width of the pronotum across the humeri, exclusive of the humeral spines.

Venter concolorous fulvous to sordid yellow except the propleura which are lightly infuscated; punctures confined to the thoracic pleura; evaporatorium concolorous with the disc and transversely rugose; auricle of the metasternal orifice small, not much longer than the diameter of the ostiole, and terminating abruptly. Legs luteous to fulvous; femora dotted with sharply defined, circular, castaneous spots which are arranged in three or four irregular annuli; tibiae terete, with similar castaneous spots, but these not arranged in a specific pattern; tarsi concolorous. Rostrum barely surpassing the metacoxae. Abdomen unmarked in any way.

Apical margin of the male genital segment thin, broadly and deeply emarginate (V-shaped); lateral apical angles thickish, acutely rounded, their inner surfaces tumid; parameres (claspers) quite small, their heads vertically weakly arcuate, blunt-tipped and not at all reaching the dorsal margins of the segment. Basal plates of the female genital valves proportionately small, nearly equilateral triangular, the apices acute and slightly tumid.

Described from four specimens.

Holotype: Male: 8.0 mm. long; 6.5 mm. wide across the humeral spines; 5.5 mm. wide across the greatest abdominal diameter. Rio Santiago, Peru. November 27, 1924. H. Bassler, collector. Deposited in the American Museum of Natural History. Unfortunately this specimen is in very poor condition; being the only male in the type series it is, however, chosen as the holotype.

Allotype: Female: 8.25 mm. long; 7.5 mm. wide across the humeral spines; 6.0 mm. wide across the greatest abdominal diameter. Rio Santiago, Peru. November 27, 1924. H. Bassler, collector. Deposited in the American Museum of Natural History.

Paratypes: One female, Upper Rio Maranon, Peru. October 11, 1924. H. Bassler, collector; one female, San Martin, San Martin, Peru. December 16, 1946. J. C. Pallister, collector. Both deposited in the American Museum of Natural History.

By virtue of the subtriangular shape of the major posterior portion of the body this species readily distinguishes itself from other known species. The brick-red dorsum, the strikingly spotted femora and tibiae, the ampliate nature of the basal portion of the abdomen and the impressed cicatrices are additional distinctive characteristics. As far as general color goes it is probably most closely related to *O. punctaria* Stal.

(*continued from page 144*)

MEETING OF NOVEMBER 20, 1956

A regular meeting of the Society was held at the American Museum of Natural History; President Vishniac presiding. The Society voted unanimously to send a letter of congratulations to Professor Von Frisch, upon his 70th birthday. A letter from the Zoological Society of London expressing thanks for our contribution to the Zoological Record Fund was read. Mr. Peter Farb was elected to membership in the Society.

Dr. Treat introduced the speaker of the evening, Dr. Ilse Schwink, a visiting investigator at New York University. Dr. Schwink discussed "Orientation in Moths", drawing extensively upon her own very interesting experiments conducted in Von Frisch's laboratory.

Females of the silkmoth, *Bombyx mori* secrete an odor which initiates the mating flight of the males. The male moths, however, do not locate the female by flying toward the source of this odor, as has commonly been supposed. Instead, the males fly against the wind, a reaction which usually brings them fairly close to a female moth. Then, over a distance of a few feet, the males can locate the females by smell, and mating ensues.

Dr. Schwink suggested that the female odor might more properly be considered a "releaser" of behavior than an attractant, and this hypothesis was supported by numerous laboratory experiments. The releaser substance has been chemically characterized in Professor Butenandt's laboratory, and found to be an alcohol-like substance of fairly low molecular weight, probably having 10 to 15 carbon atoms. The substance is active as an alcohol but not as an ester, or in its bound form within the gland. It is a stable substance during several hours in the atmosphere, and is largely species-specific.

Ablation experiments showed that the receptors for this odor are distributed over the entire antenna of the male moth; removal of parts of the antenna diminishing the response of the male in a manner exactly similar to the effect of diluting the releaser substance to a weaker concentration.

A lively question period continued until 9:45 P.M. when the meeting was adjourned.

EDWARD S. HODGSON, *Secretary*

(*continued on page 160*)

A NEW SPECIES OF STENEOTARSONEMUS, AND ADDITIONAL INFORMATION ON THE PLANT-FEEDING HABITS OF STENEOTARSONEMUS FURCATUS DE LEON (ACARINA)[1]

By Robert E. Beer
Department of Entomology, University of Kansas

Very little is known about the food habits of tarsonemid mites. Of the forty-one species in the family Tarsonemidae known to occur in North America, twelve are definitely known to feed on the higher plants and five are definitely fungivorous. Of the remaining twenty-four species, circumstances attending their collection would suggest that five of the species probably feed on higher plants, twelve are probably fungivorous, possibly two species are parasitic on arthropod hosts and the feeding habits of five species are open to considerable question. Since it is obvious that behavioral differences and similarities often provide valuable clues for systematic alignment of species, this paper reports new information on feeding habits of two species of tarsonemid mites. It is to be noted that the new hosts here recorded are plants that are grown commercially and hence both of the mite species should be considered as potential greenhouse pests in situations where the host plants are grown.

Steneotarsonemus keiferi, new species

Male.—Body broadly oval, broadest slightly behind main body suture. Legs short and stout, the anterior pairs subequal in size, posterior pairs both well-developed. Apodemes conspicuous and of typical design and location. Dorsum with three well-defined plates, each finely and densely punctate, the propodosomal shield trapezoidal and bearing near its lateral margins four pairs of setae; metapodosomal shield hemispherical, with three pairs of setae near its lateral margins; opisthosomal shield rectangular, with a pair of setae near posterolateral extremities. Dorsal propodosomal setae in linear longitudinal series, the third and fourth setae subequal in length but third more stout; first seta two thirds as long as third and one and one-fourth times as long as second. First dorsal hysterosomal setae slightly longer than longest propodosomals, twice as long as second and third dorsal hysterosomals which are of equal size. Dorsal opisthosomals

[1] Contribution No. 1012, Department of Entomology, University of Kansas.

slightly longer and more robust than second and third hysterosomals. First ventral propodosomal setae very small, one half as long as second dorsal propodosomals, situated one and one-half times length of seta from Y-shaped juncture of apodemes, toward middle of interapodemal area. Second ventral propodosomals only slightly longer than first setae, located near center of interapodemal areas. First ventral hysterosomals twice as long as ventral propodosomals, located on apodemes III at their anterior extremities. Second ventral hysterosomals slightly longer than setae of first pair, located on apodemes IV at about mid-length of apodemes.

Capitulum: Subcordate, as broad as long; length, 33μ; greatest width 36μ; dorsal setae as long as first dorsal propodosomals, ventral setae two-thirds as long. Palpi short and robust, terminal setae spinelike. Chelicerae short, needlelike; length from tips to slightly recurved and flanged bases about equal to length of third dorsal hysterosomal seta.

Legs: Legs I and II subequal in general size and segmentation; leg I with simple setae distributed as follows: femur and genu each with four, tibia with five, tarsus with three; modified setae as follows: tibia with three specialized setae located dorsally nearly in transverse alignment, the one nearest to inner margin of segment shortest and peglike, beside it a slightly longer capitate seta, beside capitate seta a slightly longer, tapering, peglike seta; four stout, curved, blunt setae on tarsus, one short, stout, peglike seta located dorsally near base of segment, a similar seta ventral in position near apex; tarsus subtended by a large disclike empodium and a stout curved claw. Leg II with simple setae distributed as follows: femur and genu each with three, tibia and tarsus each with four; two short, stout sensory pegs near base of tarsus, the segment subtended by two stout, curved claws and a broadly circular empodium. Leg III with simple setae as follows: femur with one, genu with three, tibia and tarsus each with four; one stout lanceolate seta located ventrally at apex of tarsus, this segment subtended by two stout, curved claws between and beyond which projects broad circular empodium. Leg IV robust, coxa with one ventral seta as long as segment; femur with outer margin strongly convex, inner margin with truncated projection at midlength of segment and bearing a short, stout, dorsal seta, one dorsal seta near outer margin at mid-segment, one ventral seta near inner margin at apex of segment; tibia slightly longer than broad, outer margin straight, inner margin slightly concave, with one stout spiculate seta twice as long as segment located ventrally near apex of segment, one dorsal peglike seta with length equal to width of segment situated near outer apical margin; tarsus very small, bearing three small setae, two of which are ventral, one dorsal; leg terminates with a strong, stout, curved claw.

Genital papilla: Length, 32μ; width, 32μ; subcordate, with a pair of short setae near lateral margins at posterior fourth of papilla; pregenital papilla conspicuous, heavily sclerotized, located the width of coxa IV anterior to anterior margin of genital papilla.

Measurements: Length from tips of palpi to apex of genital papilla, 219μ; main body suture to apex of genital papilla, 120μ; greatest width of body, 117μ.

FEMALE.—Body broadly oval, broadest at mid-length. Pseudostigmatic organs ovoid with acuminate apices, pedicel as long as expanded distal portion; situated laterally between and slightly above adjacent bases of coxae I and II in recessed groove overhung by dorsal shield of propodosoma. Apodemes strong and conspicuous, apodemes I, II and transverse apodemes clearly delineating the interapodemal areas of propodosoma; apodemes III and IV distinct, posterior median apodeme weak. Dorsal shield of propodosoma trapezoidal, well-defined and punctate as in male, with a pair of small setae at anterolateral extremities, a pair of stout setae as long as genu I located near posterior margin of shield, separated from each other by distance equal to three times length of seta. Stigmal openings conspicuous, located on lateral margins of dorsal shield of propodosoma, the length of first dorsal propodosomal seta behind these setae. Dorsum of hysterosoma divided transversally to form four distinct segments, the first segment with a pair of humeral and a pair of dorsocentral setae, second segment with a pair of dorsalcentrals, third segment with a pair of dorsolaterals and a pair of dorsocentrals, fourth segment with a pair of dorsolateral setae; all dorsal hysterosomal setae nearly equal in length except humerals which are twice as long. Ventral propodosomal setae minute, the first pair located in anterior fourth of interapodemal area, the second pair located adjacent to apodemes II at their mid-length. Ventral hysterosomal setae one and one-half times as long as ventral propodosomals, the first pair located on apodemes III, the second on apodemes IV; one pair of small setae near apex of hysterosoma.

Capitulum: Subcordate with posterior margin rounded truncate; length, 35μ; greatest width, 36μ. Dorsal setae slightly longer and stouter than ventral setae. Palpi short and stout, subterminal seta short, tapering, peglike. Chelicerae needlelike, one half as long as capitulum, their outward curved bases expanded.

Legs: Anterior pairs robust, subequal in size and design. Leg I with simple setae distributed as follows: four each on femur and genu, eight on tibiotarsus; specialized setae as follows: two short, stout, lanceolate setae and four long, curved setae on apical half of tibiotarsus; one short peglike, one capitate and one long peglike setae arranged in transverse row, dorsally at basal fifth of tibiotarsus and one dorsal lanceolate seta at basal fourth of segment; tibiotarsus subtends a large subcircular empodium and a strong curved claw. Leg II with simple setae distributed as follows: three each on femur and genu, four each on tibia and tarsus; modified setae on tarsus only, a stout, peglike seta near base, two stout conical setae, one located dorsally at basal third of segment the other ventrally at apex; tarsus subtends two large, spreading, curved claws between and beyond which projects a large subcircular empodium. Leg III robust with simple setae distributed as follows: three on telofemur, four each on tibia and tarsus; one stout, conical seta located ventrally at apex of tibiotarsus, this segment subtending two large, curved, spreading claws between and beyond which projects a large subcircular empodium. Leg IV coxae and trochanters small and without setae; third segment seven times as long as broad, with two simple setae the distal seta one half as long as segment;

fourth segment one third as long as third segment, the stout, spiculate subterminal seta nearly twice as long as segment, terminal seta long and slender, as long as leg IV.

Measurements: Tips of palpi to apex of opisthosoma, 250μ; tips of palpi to main body suture, 98μ; greatest width of body, 146μ.

HOLOTYPE: Male, Sharp Park, San Mateo County, California, January 14, 1957, W. Davis, on Odontoglossum orchid (hybrid).

ALLOTYPE: Female, same data as holotype.

PARATYPES: Twenty-six males, thirty-five females with same data as holotype.

LOCATION OF TYPES: Holotype, allotype, fifteen males and twenty females of paratype series deposited in the Snow Entomological Museum, University of Kansas. Six males and ten females deposited in the collection of the Bureau of Entomology, California State Department of Agriculture, Sacramento, California. Five males and five females of paratype series deposited in the United States National Museum, Washington, D. C.

This species has a close morphological resemblance to *Steneotarsonemus furcatus* De Leon and *S. pallidus* (Banks) from which males may be distinguished most readily by the chaetotaxy of leg IV. The single collection from which the species is now known was sent to me by H. H. Keifer of the Bureau of Entomology, California State Department of Agriculture. Mr. Keifer has communicated the information that the mites were reported damaging the host orchid, though the significance and type of damage was not known to him. The species is named to honor Mr. Keifer and thus in a small way serve to recognize the fine cooperation and encouragement that the present author and many students of acarology at the University of Kansas have received from him for many years.

Steneotarsonemus furcatus DeLeon

Since the publication of the original description of *S. furcatus* by DeLeon in 1955 in which this mite species was clearly identified as feeding on an ornamental grass, *Paspalum* sp., further host associations have not been reported. It is of considerable interest that a second green plant host is now known to be damaged by this mite. Several specimens were sent to me by A. E. Pritchard (University of California) with a notation that a report had been received that severe infestations had been discov-

ered in greenhouse-grown maranta plants. The mites were apparently causing a severe distortion of leaf growth giving a stunted appearance to the infested plants. This information was later confirmed by H. H. Kiefer (California State Department of Agriculture) who had received a similar report.

The first collections that I received were taken by an unidentified collector from *Maranta leuconeura* var. *Kerchoveana,* originally grown in Buena Park, Los Angeles County, California but intercepted in the city of Los Angeles on August 26, 1953. Subsequently several specimens collected by D. H. Byers from *Maranta leuconeura* at Buena Park on September 4, 1953 were sent to me for identification.

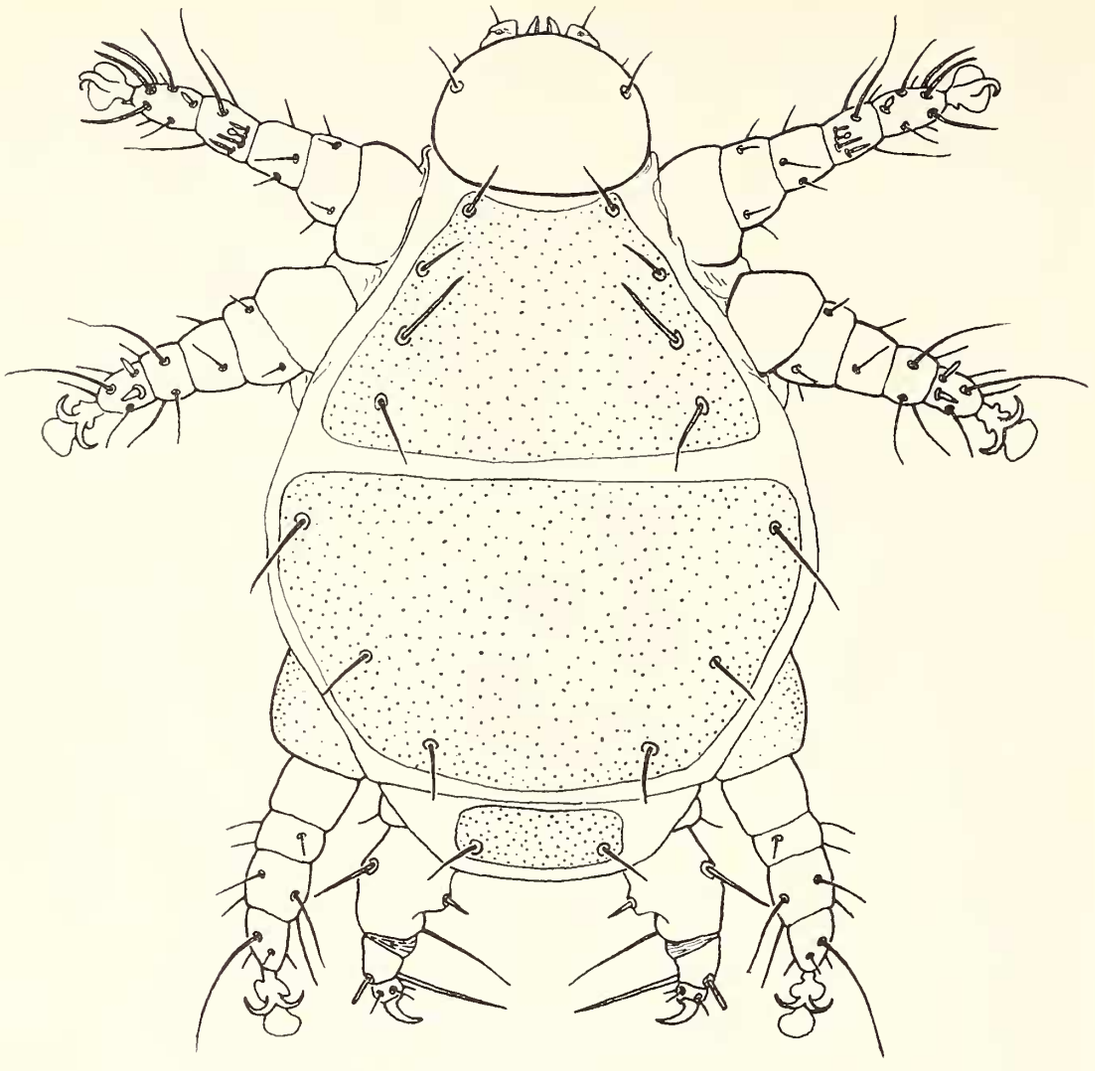
Most of the species of tarsonemid mites that are definitely known to feed on the higher plants seems to show a high degree of host specificity. Notable exceptions are *Steneotarsonemus pallidus* and *Hemitarsonemus latus.* Both of these species have long lists of plants that apparently are suitable hosts, however none of the included hosts are grasses. Several species of *Steneotarsonemus* show a definite predilection for various species of Gramineae, some apparently being restricted to a single host species and others feeding on several kinds of grasses. *S. furcatus* is therefore the first tarsonemid species for which a grass and a non-grass plant apparently serve as suitable hosts.

With this added bit of information, the somewhat paradoxical situation noted by Beer (1954) that within the genus *Steneotarsonemus* there was a sharp delineation of species groups based upon food plant preferences can be reconsidered. In the matter of host plant selection, at least, the members of the genus *Steneotarsonemus* now seem to consist of several species of grass-feeders, several non-grass feeders and this one species that feeds on both types of green plants.

LITERATURE CITED

BEER, R. E. 1954. A revision of the Tarsonemidae of the Western Hemisphere. Univ. Kansas Sc. Bull. **36**: 1091–1387.

DE LEON, D. 1956. Four new Acarina in the family Tarsonemidae. Florida Ent. **39**: 105–112.



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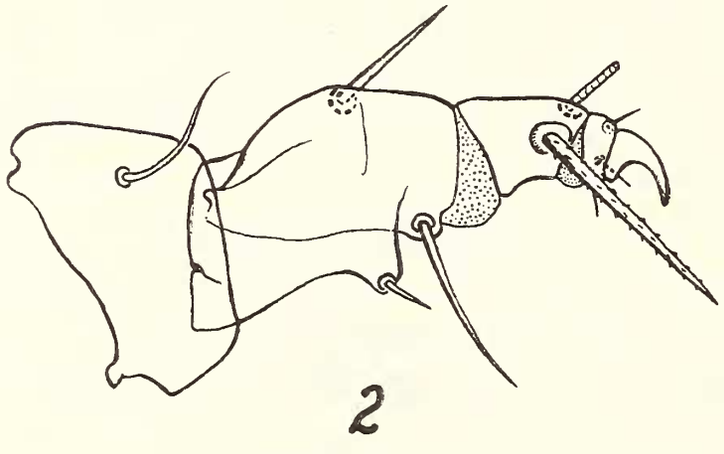

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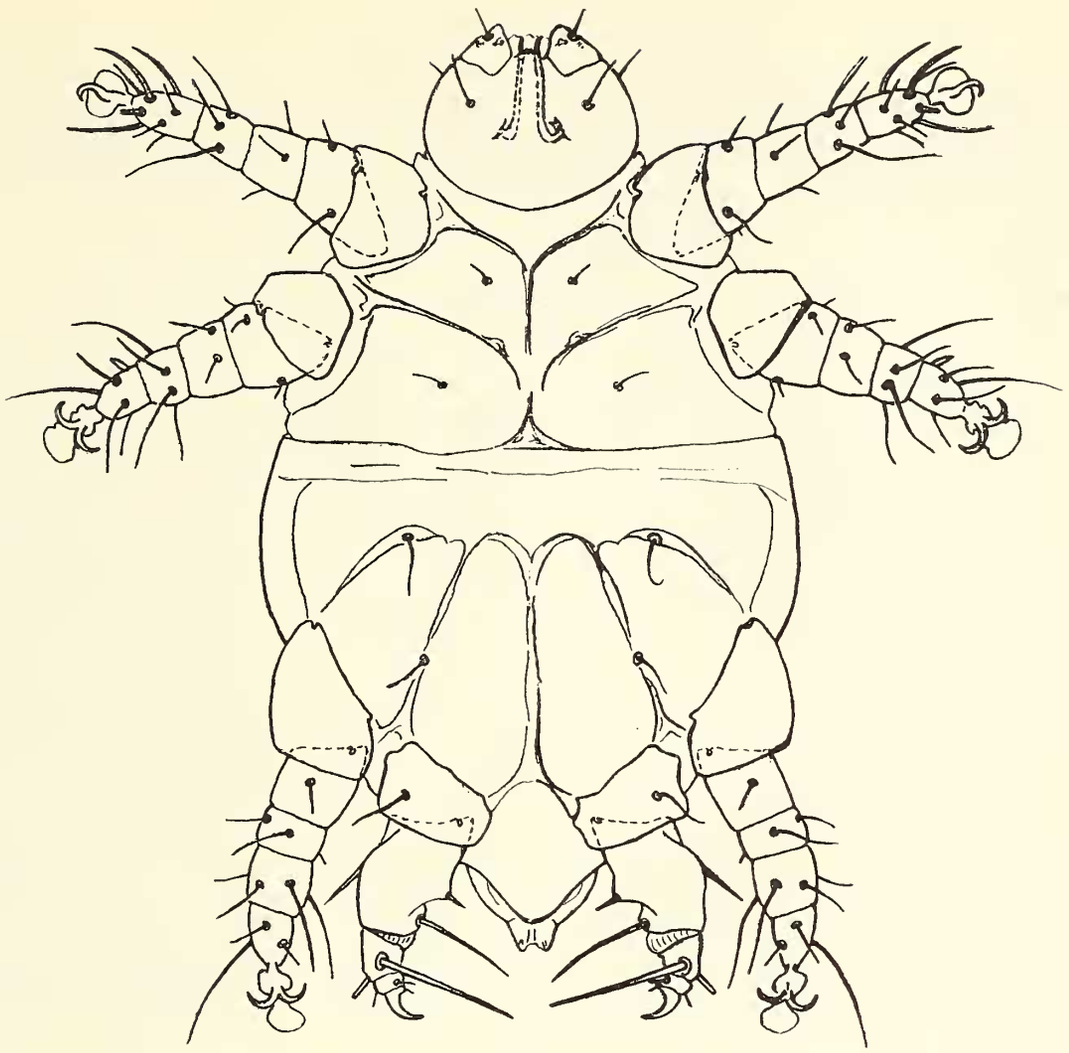
Fig. 1. **Steneotarsonemus keiferi,** new species, male, dorsal aspect.
Fig. 2. **S. keiferi,** n. sp., male leg IV in ventral aspect.



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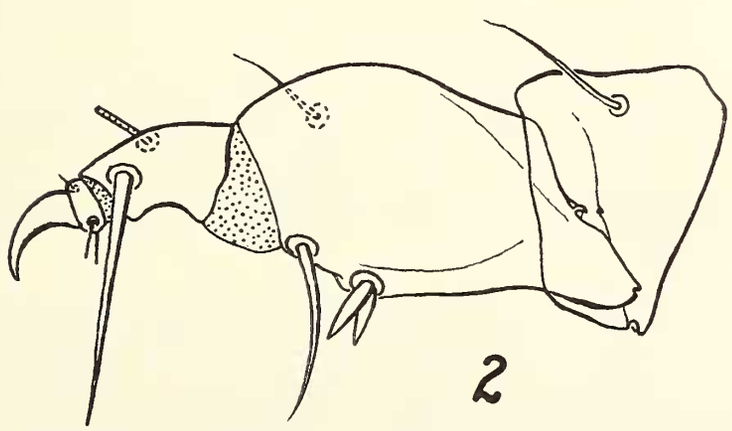

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Fig. 1. **Steneotarsonemus keiferi,** new species, male, ventral aspect.
Fig. 2. **S. furcatus** DeLeon, male leg IV in ventral aspect.

(*continued from page 152*)

MEETING OF DECEMBER 4, 1956

A regular meeting of the Society was held at the American Museum of Natural History; President Vishniac presiding. Drs. Treat and Vishniac gave brief announcements about the AAAS and Entomological Society of America meetings to be held in New York the last week of December.

The Society was especially fortunate to have honorary member Su Zan Swain, as the speaker of the evening. Mrs. Swain presented a "Survey of Illustrations of Insects" which included an exhibition of fifteen volumes and folios of special interest. Some of these were published before 1700, and most appeared before 1756. Mrs. Swain commented that the art of painting insects was most perfect about 200 years ago and has declined since.

Among the interesting examples discussed was the work of Marian Merian who same to America in 1690 for the sole purpose of studying insects in Dutch Guinea, and published hand painted wood engravings of many tropical species. The volume of paintings by Carl Clerck included insects mounted by Linnaeus himself, only six or seven copies of this rare work are known to be in existence. Another rarity, the paintings of Titian Peale, an early American naturalist, was also displayed. Mr. Peale's paintings and manuscript have not been published to this day.

Mrs. Swain exhibited some of her own insect paintings and discussed the problems and criteria of judgment involved in this type of illustration. Her objective has been to paint insect portraits, with the insect as naturally posed as possible, having all identifying characters clearly revealed. Microscopic study of live animals, museum specimens or photographs as well as special photographic paints and special methods of transferring sketches are used.

Following the talk the members and guests browsed over the exhibit of paintings which Mrs. Swain had assembled, and a few tasted of some caterpillars, grasshoppers, and bees which Mrs. Swain provided as surprise refreshments.

EDWARD S. HODGSON, *Secretary*

MEETING OF JANUARY 15, 1957

The meeting was called to order at 8:10 P.M. in Room 419 of the American Museum of Natural History. President Vishniac was in the Chair. There were 15 members and 40 visitors present.

This being the Annual Meeting of the Society, President Vishniac called for reports of the various officers.

Mr. Soraci, Editor of the Journal reported that the 1955 volume of the Journal was in the hands of the printer and would be issued shortly and that the 1956 volume was in the process of being compiled and would very soon go to the printer. It should be issued shortly after the appearance of the 1955 volume. Each will represent one full year's issue.

Dr. Asher Treat, Chairman of the Program Committee announced that

(*continued on page 170*)

UNDESCRIBED SPECIES OF CRANE-FLIES FROM THE HIMALAYA MOUNTAINS (TIPULIDAE, DIPTERA), III[1]

By Charles P. Alexander
Amherst, Massachusetts

The preceding part under this general title was published in the JOURNAL OF THE NEW YORK ENTOMOLOGICAL SOCIETY, **65**: 147–157; 1957 (publ. 1958). The materials discussed at this time were secured by Dr. Edward I. Coher and native assistants in various parts of Nepal in 1957. The conditions under which these collections were made is discussed in some detail in two earlier papers.[2] In these the opinion is expressed that the crane-fly fauna of east-central Nepal is quite distinct from that of the Darjeeling District some 200 miles to the east. The rich collections made by Dr. Coher in 1957 bear this out and it may be stated that the great majority of the species are distinct from those known from Darjeeling and vicinity, being more like those of western China and northeastern Burma. It is certain that an exceedingly rich crane-fly fauna exists throughout the eastern Himalayas. I wish to express my continued thanks to Dr. Coher for the time and effort devoted to collecting these flies, the types of all novelties being preserved in my collection.

Lipsothrix malla new species

General coloration of the mesonotum brown, pleura light yellow; antennae of male relatively long, about one-third the body; knobs of halteres infuscated; legs pale brown, tips of femora and tibiae narrowly darkened; wings with a weak dusky tinge, stigma pale brown; male hypopygium with the interbases very slender, slightly expanded at tips; phallosome large and complex, appearing as paired curved rods from expanded bases.

MALE. Length about 6.5–7 mm.; wing 7–7.5 mm.; antenna about 2–2.4 mm.

[1] Contribution No. 1293 from the Entomological Laboratory, University of Massachusetts.

[2] Alexander, C. P. Undescribed species of crane-flies from the Himalaya Mountains (Tipulidae, Diptera), I. Journ. N. Y. Ent. Soc., 64: 137–147; 1956 (published 1957).

Alexander, C. P. New or little-known Tipulidae from eastern Asia (Diptera), XLV. Philip. Journ. Sci. (in press, 1958).

Rostrum yellow to brown; palpi black. Antennae of male relatively long, about one-third the body; scape and pedicel yellow, flagellum dark brown; flagellar segments elongate, clothed with a dense white pubescence and sparse scattered slightly longer verticils that are much shorter than the segments. Head yellowed in front, darker behind; in the paratypes the head is darkened throughout.

Pronotum dark brown; pretergites yellow. Mesonotal praescutum with medium brown stripes, the restricted interspaces a little paler; scutal lobes dark brown; scutellum paler brown, parascutella yellow; mediotergite dark brown. Pleura light yellow, the pleurotergite a trifle darker. Halteres with stem whitened, knob infuscated. Legs with all coxae and trochanters pale yellow; remainder of legs pale brown, the tips of the femora and tibiae narrowly brown to black; claws with a single acute tooth. Wings with a weak dusky tinge; stigma oval, pale brown; veins brown. Venation: *Sc* long, Sc_1 ending opposite the fork of *Rs*, Sc_2 near its tip; R_2 shorter than either R_{1+2} or R_{2+3}, the latter shorter than R_{1+2}; R_{2+3+4} slightly longer than cell *1st* M_2, the latter rectangular; *m–cu* at or shortly beyond the fork of *M*. One wing of one paratype has cell M_2 open by the atrophy of *m*.

Abdominal tergites brown, the outer segments, including the hypopygium, still darker, sternites more reddish brown. Male hypopygium with the dististyles terminal, the outer style slender with both the apical and subapical spines acute; inner style broadest on basal half, narrowed outwardly, tipped with unusually long setae. Interbase very slender, the apex a little expanded, pale. Phallosome large and complex, appearing as paired curved rods from expanded bases, the length slightly greater than that of the basistyle.

Holotype, ♂, Simbhanjang Pass, Nepal, 8197 feet, June 24, 1957 (Coher). Paratopotypes, 2 ♂♂.

The most similar regional species include *Lipsothrix burmica* Alexander and *L. kashmirica* Alexander, readily distinguished by the structure of the male hypopygium, particularly the interbases.

Lipsothrix chettri new species

General coloration of thorax yellow, the dorsum more fulvous yellow; head reddish brown; pronotal scutum dark brown; halteres yellow; legs yellow, the tips of the femora and tibiae very narrowly and inconspicuously darkened; wings pale yellow, veins yellow; Sc_1 ending nearly opposite the fork of *Rs;* cell *1st* M_2 very small, M_{3+4} from two-fifths to one-third as long as vein M_4.

FEMALE. Length about 8 mm.; wing 7.5 mm.

Rostrum reddish brown; outer segments of palpi black. Antennae with basal segments brownish yellow, outer segments dark brown; flagellar segments subcylindrical, subequal to the longest verticils. Head reddish brown.

Pronotal scutum dark brown, scutellum and pretergites pale yellow. Mesonotum fulvous yellow, with an opaque more yellowed bloom. Pleura

yellow. Halteres yellow. Legs with all coxae and trochanters light yellow; remainder of legs obscure yellow, the tips of the femora and tibiae very narrowly and inconspicuously darkened; teeth of claws small, basal in position. Wings pale yellow, unpatterned; veins yellow. Veins of outer half of wing with macrotrichia. Venation: Sc_1 ending nearly opposite the fork of *Rs*, Sc_2 near its tip; R_{2+3+4} gently arcuated, about one-half longer than cell *1st* M_2; veins R_{2+3}, R_2 and R_{1+2} subequal; cell *1st* M_2 small, rectangular, vein M_{3+4} about two-fifths to one-third as long as M_4; *m–cu* at or shortly beyond the fork of *M*.

Abdomen reddish brown, basal tergites darker brown medially above. Ovipositor with valves reddish horn color.

Holotype, ♀, Simbhanjang Pass, Nepal, 8197 feet, June 24, 1957 (Coher).

The most similar regional species having the body, halteres and wings pale yellow and with the venation somewhat the same is *Lipsothrix flavissima* Alexander, of northeastern Burma. This differs in slight details of coloration and venation, particularly of the medial field. I have no doubt but that the discovery of the male sex will provide stronger points of distinction between the two flies.

Gonomyia (Ellipteroides) ebenomyia new species

General coloration of body and appendages black, including the antennae, halteres and legs; wings strongly blackened; cell *2nd* M_2 slightly longer than its petiole, *m–cu* nearly one-half its length before the fork of *M*; ovipositor with the cerci unusually long and slender.

FEMALE. Length about 6.5 mm.; wing 5 mm.

Rostrum dull black; palpi black. Antennae black throughout; basal flagellar segments suboval, with truncated ends, outer segments slightly more elongate; verticils exceeding the segments. Head dull black, sparsely pruinose; anterior vertex broad.

Thoracic dorsum black, surface subnitidous; posterior sclerites and pleura somewhat duller; dorsopleural membrane and meron a trifle paler. Halteres and legs black throughout, the latter conspicuously hairy. Wings with a strong blackish tinge, the long narrow stigma darker; veins brown. Vein beyond cord with strong macrotrichia, lacking on R_{2+3+4} and bases of R_3 and R_4. Venation: Sc_1 ending about opposite midlength of *Rs*; R_{2+3+4} about twice the basal section of R_5; cell *2nd* M_2 slightly longer than its petiole; *m–cu* from about one-third to nearly one-half its length before the fork of *M*.

Abdomen black. Ovipositor with the cerci only slightly hairy, long and slender, especially the outer half; in the type slide, the cerci are twisted just beyond midlength, possibly representing a normal condition.

Holotype, ♀, Parewavir, Nepal, March 28, 1957 (Coher).

The most similar regional species is *Gonomyia* (*Ellipteroides*)

schmidi Alexander, of the western Himalayas, differing particularly in the details of venation. The female sex of *schmidi* is still unknown. It may be noted that the structure and vestiture of the cerci of the present fly are quite different from the condition in various Ceylonese species of the subgenus where the female sex is known.

Gonomyia (Idiocera) coheriana new species

Mesonotum brown, the posterior sclerites darker; pleura infuscated dorsally, clear yellow below; rostrum and palpi black; basal segments of antennae light yellow, flagellum brownish black; legs yellow, the outer tarsal segments black; wings subhyaline, restrictedly patterned with darker; male hypopygium with the apical lobe of the basistyle stout, tip obtuse; four dististyles, the outer a slender rod with about five small spinules on surface; apex of aedeagus recurved.

MALE. Length about 5 mm.; wing 5.5 mm.

Rostrum and palpi black. Antennae with the scape and pedicel light yellow, flagellum brownish black; basal flagellar segments long-suboval, outer ones more elongate, a little shorter than the longest verticils. Head light yellow in front, more infuscated on posterior half and as a central darkening on the vertex.

Pronotum and pretergites light yellow. Mesonotal praescutum chiefly covered by three confluent brown stripes, the humeral and lateral regions yellow, pseudosutural foveae reddish; scutal lobes brown, scutellum and postnotum darker brown. Pleura with the dorsal half moderately infuscated, the ventral portion clear light yellow. Halteres infuscated. Legs with the fore coxae weakly infuscated, remaining coxae and trochanters yellow; remainder of legs yellow, tips of tibiae narrowly darkened, outer tarsal segments black. Wings subhyaline, base and costal region more yellowed; a restricted and inconspicuous brown pattern, including the small stigma and still smaller marks at origin of *Rs*, cord, *m–cu* and tip of vein R_4; a paler brown subterminal wash in cells R_3 and R_4; veins light brown, more brownish black in the patterned areas. Venation: *Sc* short, Sc_1 ending just beyond the perpendicular origin of *Rs*, Sc_2 retracted; distance on costa between R_{1+2} and R_3 only about one-third to one-fourth the latter; cell *2nd* M_2 about one-half longer than its petiole; *m–cu* about twice its length before the fork of *M*.

Abdominal tergites brown, incisures narrowly pale, sternites light yellow; hypopygium brownish yellow. Male hypopygium with the lobe of the basistyle long, stout, tip broadly obtuse. Four dististyles or profound branches; outer style a long slender gently sinuous rod or spine, extended into a long point, on surface beginning at near midlength with five or six acute spinules, the outer one smallest; second style longest, on outer two-thirds more expanded into a curved flattened blade, tip obtuse, surface glabrous; intermediate style shorter, stem pale, apex darker and more expanded, weakly and unequally bifid, margins irregularly toothed or erose;

innermost style smallest, a simple straight rod that narrows to an acute spine, before apex with about three long pale setae, with still others along the lower margin; additional to the four major dististyles a further small pale needlelike point, about one-half as long as the innermost style. Aedeagus slender, its tips gently recurved into a crook.

Holotype, ♂, Parewavir, Nepal, March 26, 1957 (Coher).

I take great pleasure in dedicating this very interesting *Idiocera* to the collector, Dr. Edward I. Coher, my former student and fellow specialist in the Diptera. While generally similar to some other regional species, such as *Gonomyia* (*Idiocera*) *petilis* Alexander, it differs strikingly from all previously known species in the structure of the male hypopygium, particularly the outermost dististyle.

Gonomyia (Idiocera) satanas new species

General coloration of entire body, including also the mouthparts, antennae, halteres and legs, black; wings strongly tinged with blackish, stigma still darker; Sc_1 fully twice as long as *m–cu;* vein R_3 suberect, on costa separated from R_{1+2} by a distance about two-thirds its length; *m–cu* about its own length before the fork of *M*.

FEMALE. Length about 5.5 mm.; wing 5 mm.

Rostrum and palpi black. Antennae black throughout; flagellar segments oval. Head black.

Thorax uniformly dull black or plumbeous black, the pseudosutural foveae more intense polished black. Halteres black. Legs entirely black. Wings strongly tinged with blackish, the oval stigma still darker; veins brownish black, those in the prearcular field brown. Venation: Sc_1 ending just beyond the origin of *Rs*, Sc_1 alone fully twice *m–cu;* vein R_3 suberect, separated from R_{1+2} on costa by a distance about two-thirds its length; cell *2nd* M_2 more than twice its petiole; *m–cu* about its own length before the fork of *M*.

Abdomen dull brownish black to black, including the ovipositor.

Holotype, ♀, Jhawani, Nepal, March 19, 1957 (Coher).

Paratopotype, 1 ♀, pinned with the type.

Readily told from all other regional members of the subgenus by the black color of the body and appendages. The most similar regional species is *Gonomyia* (*Idiocera*) *phœosoma* Alexander, readily told by the coloration of the body and legs and by the venation.

Gonomyia (Gonomyia) turritella new species

Mesonotal praescutum and scutal lobes blackish gray; rostrum yellow; antennae black throughout, pedicel enlarged; legs brown; wings faintly tinged with brown, stigma ill-delimited; *Sc* long, cell R_3 unusually large,

cell *1st* M_2 small; male hypopygium with two terminal dististyles, outer style extended into a long slender spine, inner style with a long arm that bears a single spine at apex; phallosome with the aedeagus subhyaline, tip obtuse; gonapophyses equal in size, each narrowed apically into a long slender spine.

MALE. Length about 4–4.2 mm.; wing 4.6–4.8 mm.

FEMALE. Length about 4.5 mm.; wing 4.5 mm.

Rostrum obscure yellow; palpi brown. Antennae black; pedicel enlarged; flagellar segments elongate. Head blackish, gray pruinose.

Pronotum and pretergites light yellow. Mesonotal praescutum with three blackish gray stripes that are confluent or virtually so, lateral borders light yellow; scutal lobes blackish gray, the median region yellow; scutellum pale yellow, restrictedly darkened at base, parascutella obscure yellow; mediotergite darkened on central part and behind, the anterior angles yellowed; pleurotergite yellowed dorsally, more darkened behind. Pleura with the mesepisternum and sternopleurite weakly darkened, pteropleurites meron and metapleura light yellow; propleura and dorsopleural membrane yellow. Halteres with stem dirty white, knob infuscated. Legs with coxae brownish yellow, fore pair darker in front; trochanters brownish yellow; remainder of legs brown, the outer segments a little darker. Wings faintly tinged with brown, the prearcular and coastal regions more yellowed; stigma pale brown, ill-delimited; veins brown, paler in the brightened fields. Venation: *Sc* long, Sc_1 ending about opposite two-fifths the length of *Rs*, Sc_1 subequal to or shorter than *r–m;* cell R_3 unusually large, vein R_3 subequal to vein R_{2+3+4}, cell R_3 at margin about twice as extensive as cell R_2; cell *1st* M_2 small; *m–cu* at or beyond the fork of *M*.

Abdominal tergites brown, sternites more yellowed; hypopygium light yellow. Male hypopygium with the basistyle relatively slender, without a distinct apical lobe. Dististyles two, terminal in position; outer style smaller, appearing as a simple blade, broadest beyond midlength, gradually narrowed into a long spine, surface except at ends with abundant microscopic setulae; inner style with the body small, the fasciculate setae poorly indicated; outer surface of style produced into a long arm that extends caudad to beyond the level of apex of the outer style, before the obtuse tip with a single powerful black spine; a single seta on stem of arm at near midlength. Phallosome including a subhyaline central structure, its tip obtuse, at near one-third the length bearing a cylindrical arm; gonapophyses two, elongate, equal in size, broadest on proximal two-thirds, the outer end narrowed into a sinuous spine, the tip acute.

Holotype, ♂, Parewavir, Nepal, March 26, 1957 (Coher).

Allotopotype, ♀, March 28, 1957. Paratopotypes, 3 ♂ ♀, March 26–28, 1957 (Coher).

In its somewhat distinctive venation, the present fly is most like *Gonomyia* (*Gonomyia*) *resoluta* Alexander, of Malaya, differing in coloration and in the details of venation. The male sex of resoluta is still unknown.

Erioptera (Erioptera) regina new species

Size large (wing of female 6.8 mm.); general coloration of mesonotum polished fulvous and yellow, pleura yellow with blackened heavily pruinose areas; halteres yellow; legs yellow, tips of femora narrowly but conspicuously black; wings weakly tinged with brown, conspicuously patterned with light yellow, including the base, costal border and a broad seam over the cord; abdominal tergites brownish yellow, conspicuously blackened laterally and on the pleural membrane; sternites brownish black.

FEMALE. Length about 7 mm.; wing 6.8 mm.

Rostrum and palpi brown. Antennae with the scape black, remainder of organ brown; flagellar segments suboval, the outer ones more elongate, verticils exceeding the segments. Head polished black, vaguely pruinose in front.

Pronotum obscure yellow. Mesonotal praescutum and scutal lobes polished fulvous, the interspaces more brownish yellow; posterior sclerites of notum light yellow. Propleura dark brown; mesopleura polished yellow to fulvous, with brownish black areas on the anepisternum, ventral sternopleurite and metapleura, these regions heavily light gray pruinose; a blackened spot immediately before the wing root; dorsopleural membrane yellowed. Halteres short, pale yellow. Legs with coxae and trochanters yellow; remainder of legs light yellow, the tips of the femora narrowly but very conspicuously black, involving about one-fifteenth of the segment or less. Wings weakly tinged with brown, conspicuously patterned with light yellow, including the prearcular and costal regions and a broad seam over the cord; narrower and less evident yellow areas around the wing tip and along vein *Cu* to the margin; veins yellow. Venation: Vein *2nd A* moderately sinuous, ending opposite the posterior end of the oblique and gently sinuous *m–cu*.

Abdominal tergites obscure orange yellow, the basal segment, lateral borders of the remaining tergites, and the dorsopleural membrane blackened; sternites brownish black, terminal segment more yellowed. Ovipositor with the cerci horn-yellow, strongly upcurved to the acute tips.

Holotype, ♀, Suna Chudi, Nepal, in jungle, March 23, 1957 (Coher).

The most similar regional species is the equally large *Erioptera* (*Erioptera*) *rex* Alexander, of northeastern Burma, which differs especially in the coloration of the body and legs. The abruptly blackened femoral tips of the present fly are particularly distinctive.

Molophilus (Molophilus) gurkha new species

Belongs to the *gracilis* group and subgroup; size medium (wing of male 5.3 mm.); general coloration of mesonotum reddish brown, postnotum and dorsal pleura darker; legs yellow, tarsi brownish black; wings grayish yellow; hypopygium yellow, basistyle with only two lobes, both fleshy; two terminal dististyles, both large and conspicuous; outer style broad on basal

half, thence strongly bent and narrowed into a long black spine, inner style slender, its outer third blackened and dilated into a head; aedeagus unusually stout.

MALE. Length about 4.5 mm.; wing 5.3 mm.

Rostrum brown; palpi dark brown. Antennae broken beyond the pedicel. Head dark brown.

Cervical region and anterior pronotum dark brown, scutellum and pretergites yellowed. Mesonotal praescutum chiefly reddish brown, lightly gray pruinose, humeral region more yellowed, pseudosutural foveae pale; scutal lobes reddish brown, scutellum more testaceous; postnotum darker brown. Pleura brown dorsally and behind, the sternopleurite and meron more yellowed. Halteres weakly darkened, especially the knobs. Legs with all coxae and trochanters pale yellow; femora and tibiae yellow, the tarsi brownish black. Wings grayish yellow, the prearcular and costal fields clearer yellow; veins brownish yellow, macrotrichia darker. Venation: R_2 lying slightly beyond the level of *r–m;* R_{4+5} subequal to *r–m;* petiole of cell M_3 approximately three times *m–cu;* vein *2nd A* gently sinuous, ending before the level of *m–cu.*

Abdomen dark brown; hypopygium yellow. Male hypopygium having the basistyle with only two lobes, the usual dorsal one apparently lacking, the remaining two placed close together and evidently representing the ventral and mesal lobes, the latter a little smaller. Dististyles two, terminal, large and conspicuous; outer style flattened on more than the basal half, thence bent at a right angle into a long black spine, surface of style glabrous; inner style blackened on the slightly enlarged outer third, the apex a short point, on outer margin near base of the head with a microscopic spinule. Aedeagus unusually stout, the tip very slender. Phallosomic plate relatively broad, the apex narrowly obtuse, surface microscopically setulose.

Holotype, ♂, Tribhuvia Rath, Nepal, Bhainse-Kathmandu Road Mile 61.7, altitude 1925 meters, April 8, 1957 (Coher).

Molophilus (*Molophilus*) *gurkha* is readily told from all other generally similar regional species, including *M.* (*M.*) *inconspicuus* Brunetti, by the structure of the male hypopygium, especially the basistyle, dististyles and aedeagus.

Molophilus (Molophilus) sherpa new species

Belongs to the *gracilis* group and subgroup; size small (wing of male less than 3.5 mm.); general coloration of thorax reddish brown; wings narrow, tinged with pale brown, costal region light yellow, vein *2nd A* unusually short, ending before the level of *m–cu;* male hypopygium with the ventral lobe of basistyle with a small blackened point, mesal lobe a larger spine; two unequal dististyles, the inner one shorter, with a long brush of setae on mesal face.

MALE. Length about 3 mm.; wing 3.3 mm.

Rostrum brown; palpi black. Antennae short, brownish yellow; flagellar

segments suboval, basal verticils longer than the segments. Head brown.

Pronotum brownish yellow above, dark brown on the sides. Mesonotum almost uniformly reddish brown, the lateral borders narrowly more yellowed; posterior sclerites of notum reddish brown, postnotum vaguely pruinose. Pleura obscure yellow, weakly infuscated dorsally and behind. Halteres with stem obscure yellow, knob slightly more darkened. Legs with the coxae and trochanters obscure yellow; remainder of legs broken. Wings narrow, tinged with pale brown, more fulvous in the Anal field, costal area light yellow; veins pale brown. Venation: R_2 lying immediately before the level of *r–m;* petiole of cell M_3 about two and one-half times *m–cu;* vein *2nd A* unusually short, gently sinuous, ending distinctly before the level of *m–cu.*

Abdomen brown, hypopygium more yellowed. Male hypopygium with the dorsal lobe of the basistyle relatively slender, obtuse at tip, with scattered setae to the apex; ventral lobe broad, terminating in a small blackened point or spine; what seems to represent the usual mesal lobe is a single powerful blackened spine. Two dististyles, the outer one long and slender, straight on about the basal six-sevenths, the tip narrowed and curved into a spine, with a small point or tubercle on outer margin at the bend; inner style about two-thirds as long, nearly straight, terminating in a long spine, inner margin at near midlength with a dense brush of long strong black setae. Phallosomic plate broad and obtuse, its surface microscopically setuliferous.

Holotype, ♂, Baridamar, Nepal, August 2, 1957 (Coher).

Molophilus (*Molophilus*) *sherpa* is quite distinct from the other described Himalayan species in the diagnostic features, especially those of the male hypopygium. While generally similar to species such as *M.* (*M.*) *diversilobus* Alexander and *M.* (*M.*) *inconspicuus* Brunetti, it is quite distinct in these structures.

Molophilus (Molophilus) lepcha new species

Belongs to the *gracilis* group, *procericornis* subgroup; general coloration of thoracic dorsum dark reddish brown, pleura more blackened; antennae of male more than one-half the length of the wing; male hypopygium with the dorsal lobe of the basistyle longer than the body of the style, its apex narrowed and glabrous; two dististyles, the outer a blackened rod, the tip acute; inner style expanded on basal two-thirds, with sparse setae.

MALE. Length about 5.5 mm.; wing 5 mm.; antenna about 3 mm.

Rostrum dark brown; palpi black. Antennae of male black throughout, elongate, as shown by the measurements; flagellar segments elongate-fusiform, with very long outspreading black setae, as in the subgroup, these longer than the verticils. Head dark brown.

Thoracic dorsum chiefly dark reddish brown, the humeral region of the praescutum and the restricted pretergites obscure yellow. Pleura blackened, evidently darker than the notum. Halteres broken. Legs with the

coxae and trochanters yellowed; remainder of legs brownish yellow to light brown, the outer tarsal segments slightly darker. Wings broad, faintly tinged with brown; veins and macrotrichia darker brown. Venation: R_2 virtually in transverse alignment with *r–m;* petiole of cell M_3 about twice the oblique and somewhat sinuous *m–cu;* vein *2nd A* relatively short, ending opposite the posterior end of *m–cu.*

Abdomen, including the hypopygium, dark brown. Male hypopygium with the dorsal lobe of the basistyle longer than the body of style, the narrowed glabrous apex slightly curved; ventral lobe basal in position, small, with retrorse setae at apex; mesal lobe apical, very slender, with long setae. Two dististyles, the outer a simple glabrous blackened rod, narrowed very gradually to the acute tip, inner style a trifle shorter, with nearly the basal two-thirds more expanded, provided with sparse setae; outer third narrowed and blackened, with a few setulae on outer margin immediately back from the acute tip.

Holotype, ♂, Nayagaon, Nepal, altitude 520 meters, March 10, 1957 (Coher).

Molophilus (*Molophilus*) *lepcha* is allied to species such as *M.* (*M.*) *laxus* Alexander and *M.* (*M.*) *assamensis* Alexander, differing from these and all other regional members of the *procericornis* subgroup in the structure of the male hypopygium.

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the programs for the coming meetings were completed except for one speaker.

Mr. Jacob Huberman, Treasurer, reported that there are 130 paid up members with subscriptions; 13 paid up members without subscriptions; and 196 subscribers without membership. The cash balance on hand is $1112.44 and the capital fund amounts to $4514.05.

The Secretary, Dr. Hodgson being absent, Dr. Ruckes was asked to substitute for him.

The Nominating Committee (Dr. James Forbes, Chm., Dr. Lucy Clausen and Edwin W. Teale) presented the following slate of Officers for the year 1957:

President, Dr. Asher Treat
Vice-president, Dr. William S. Creighton
Secretary, Dr. Edward Hodgson
Assistant Secretary, Robert Bloch
Treasurer, Jacob Huberman
Assistant Treasurer, Mrs. Patricia Vaurie
Executive Committee: E. Irving Huntington, Dr. A. B. Klots, Dr. Herbert Ruckes.
Delegate to the New York Academy of Sciences, Dr. Lucy Clausen.

There being no other nominations from the floor the nominations were

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EFFECTS OF STARVATION ON FREE AMINO ACIDS IN LARVAL BLOOD OF ORIENTAL BEETLE, ANOMALA ORIENTALIS WATERHOUSE[1]

By Donald S. Po-Chedley
Biology Department, Fordham University[2]

INTRODUCTION

Although it has been established that the nonprotein nitrogen concentration of insect haemolymph is high, the amino acids of this component have not been as thoroughly determined. With the development of the paper chromatographic method, data about the free amino acids of insect blood have increased (Auclair, 1953; Auclair and Maltais, 1954). It has been shown by Drilhon (1950), Auclair and Durbeuil (1953) and Micks (1956) that most of the naturally occurring amino acids are represented in the free state in insect blood.

While effects of starvation on body protein have been studied in certain insects (Slowtzoff, 1905; Heller, 1926; Lafon, 1941; Ludwig, 1950; Newton, 1954) there are few data pertaining to effects upon blood protein. Heller and Moklowska (1930) reported a 40 per cent decrease of blood protein in the moth, *Deilephila euphorbiae,* during starvation. Beadle and Shaw (1950) found that, while the plasma protein nitrogen of larvae of the neuropteron, *Sialis lutaria,* fell to 5 per cent of its original value, the nonprotein nitrogen (amino acids) remained constant during starvation. Analyses of the blood of starving Japanese beetle, *Popillia japonica,* larvae by Ludwig and Wugmeister (1953) showed that the blood protein nitrogen remained constant and the nonprotein and amino nitrogen components increased approximately two-fold.

The object of the present study was to note to what extent starvation affected the plasma amino acids of third instar Oriental beetle, *Anomala orientalis,* larvae.

[1] Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Fordham University. The author wishes to express his appreciation to Professor Daniel Ludwig, at whose suggestion and under whose direction this investigation was conducted.

[2] Present address: Biology Department, D'Youville College, Buffalo 1, N. Y.

MATERIAL AND METHODS

Larvae of the Oriental beetle were collected in the field and brought into the laboratory. Each larva was placed, individually, in one-ounce ointment tins containing moist soil and a few grains of wheat. The larvae were allowed to feed for two weeks at 25°C., moisture and food being replenished, when needed. At the end of the feeding period the larvae were placed in individual vials in a desiccator, the base of which was filled with distilled water. Bellucci (1939) observed that under these conditions the water content of larvae remained constant. The larvae were starved for four weeks, analyses being made at the end of each week.

Blood was collected from normal and starved larvae, etherized to prevent blood coagulation, according to the procedure reported by Ludwig (1951). Pooled, whole blood collected from larvae was used for protein and nonprotein determinations by the micro-Kjeldahl technique of Koch and McMeekin (1924) and for amino nitrogen data by the photometric method of Russel (1944). The preparation of blood for chromatographic amino acid analysis was essentially that described by Pratt (1950). A detailed account pertaining to the separation, identification and concentration of the free and derived amino acids has been reported (Po-Chedley, 1956).

OBSERVATIONS

The protein, nonprotein and amino nitrogen values are shown in Table 1. The protein nitrogen values were relatively constant

TABLE 1

CHANGES IN THE COMPOSITION OF ORIENTAL BEETLE BLOOD DURING STARVATION (VALUES IN MILLIGRAMS PER CENT)

Degree of Starvation	Protein Nitrogen	Nonprotein Nitrogen	Amino Nitrogen
Normal	310.6	511.6	196.8
1 week	300.5	547.3	255.0
2 weeks	336.1	676.5	320.8
3 weeks	329.4	849.8	343.2
4 weeks	340.7	954.1	350.7

during the four weeks of starvation, the weekly reports approximating the normal average of 310.6 mg. per cent. The nonprotein nitrogen rose steadily from a normal average of 511.6 to a final average of 954.1 mg. per cent. There was a similar increase of amino nitrogen from a normal average of 196.8 to a terminal average of 348.7 mg. per cent.

TABLE 2

CHANGES IN THE AMINO ACIDS OF THE HAEMOLYMPH OF ORIENTAL BEETLE LARVAE DURING 4 WEEKS OF STARVATION (VALUES IN MG. PER CENT AMINO NITROGEN)

Compound	Normal	1 week	2 weeks	3 weeks	4 weeks
alpha-alanine	10.8	12.7	18.8	21.6	22.6
alpha-n-amino butyric acid	5.4	5.7	9.7	9.7	10.6
arginine	4.6	5.6	8.2	10.4	11.0
asparagine	3.1	3.4	5.0	1.8	1.5
aspartic acid	4.5	5.0	10.1	13.6	15.3
beta-alanine	3.7	4.4	7.1	7.5	7.7
cystine	1.8	2.1	2.8	2.9	3.0
glutamic acid	6.7	7.3	12.8	14.5	19.5
glutamine	12.4	14.3	18.9	7.4	4.4
glycine	33.1	51.1	68.8	73.4	76.6
histidine	4.8	4.9	7.6	8.6	8.8
isoleucine	10.6	12.2	16.2	17.4	17.4
leucine	7.5	7.7	10.3	11.7	11.5
lysine	7.9	9.3	12.3	13.7	15.5
methionine	5.4	5.8	8.7	9.3	10.0
ornithine	2.5	2.9	5.6	5.8	6.1
phenylalanine	10.4	10.9	11.4	12.3	12.0
proline	2.7	3.8	6.8	7.7	8.2
serine	2.4	3.8	6.0	7.9	8.1
taurine	4.8	5.1	5.4	5.7	6.6
threonine	3.6	4.0	5.4	6.5	8.8
tryptophane	14.6	14.7	18.7	20.2	22.3
tyrosine	12.3	13.4	12.1	6.6	2.2
valine	4.2	4.8	7.8	9.2	10.6
Total	179.8	214.9	296.5	305.4	320.8

The 21 free amino acids and 3 derivatives determined in the blood of this insect and total amino nitrogen values are listed in Table 2. The compounds which occurred in highest concentration in normal larvae are glycine, alpha-alanine, glutamine,

isoleucine, phenlyalanine, tryptophane and tyrosine. All of the amino compounds, with the exceptions of the amides and tyrosine, increased during the period of inanition. The tyrosine concentration of 12.3 mg. per cent for normal larvae increased to 13.4 by the end of the first week and subsequently decreased to 2.2 mg. per cent at the end of the fourth week. The amides, asparagine and glutamine, increased during the first two weeks before decreasing to their final concentrations of 1.5 and 4.4 mg. per cent, respectively. The amino acids, isoleucine, leucine, arginine and phenylalanine, were relatively constant between the third and fourth weeks of starvation. Glycine existed in highest concentration during all analyses, whereas, cystine was consistently low.

DISCUSSION

The results of this study, which indicate that the blood protein is relatively constant in this insect during starvation, agree with the findings of Ludwig and Wugmeister (1953) for Japanese beetle larvae. The stability of blood protein in Oriental beetle larvae suggests its replacement by extravascular protein at a rate equal to its utilization. The increased amino nitrogen concentration in haemolymph of Oriental beetle larvae during starvation augments Newton's (1954) study. In that investigation of total nitrogen in starving Japanese beetle larvae the shift in nitrogen was represented by the increase of amino acids and nitrogen end-products in the blood.

It is apparent from Table 2 that the amino nitrogen of this insect is represented by a wide variety of amino acids and their derivatives, which, with three exceptions, increased in concentration during inanition. Certain phenomena, which occurred during starvation, may be interpreted on the basis of amino acid changes. The decrease in tyrosine concentration was anticipated because of observations on the blackening of blood during the bleeding process. The blood of normal and partially starved larvae usually darkens rapidly, when exposed to air, indicating the catalytic action of tyrosinase upon tyrosine to produce a melanin. This color was not as intense during the late weeks of starvation at which time the tyrosine concentration had decreased to 2.2 mg. per cent. In addition the larvae were also paler than normal at this period. This is in accord with the

findings of Golberg and De Meillon (1948) who found that both tyrosine and phenylalanine influence the pigmentation of the mosquito, *Aedes aegypti.* The phenylalanine concentration of the Oriental beetle larvae, which was relatively constant during this interval, could not, apparently, compensate for the tyrosine depletion.

The increased concentration of the amino acids, aspartic and glutamic, may be due to the conversion and decrease of asparagine and glutamine as suggested by Ussing (1946). The high concentration reported for glycine as well as the general increase for the amino acids would appear to result from the general diminished metabolic rate existing during starvation (Bellucci, 1939). In this respect Kutscher and Ackermann (1933), referring specifically to glycine, contended that the rapidity of insect metabolism prevented this acid from accumulating in high concentration in the blood. The increase of arginine during inanition suggests muscle proteolysis with the release and subsequent decomposition of phosphoarginine. Cystine values which were relatively constant indicate a retardation of its function as an important agent for moulting (Golberg and De Meillon, 1948). Similar unpublished data for the mealworm, *Tenebrio molitor,* show that both cystine and tyrosine increase in concentration prior to ecdysis and are present at a reduced level following the moult.

The two-fold increase of the free amino acids, which was observed, does not completely explain the elevated nonprotein nitrogen concentration. It may also depend on the discharge of other nitrogenous compounds, such as glucosamine, urea and various purine derivatives into the haemolymph.

SUMMARY

1. Oriental beetle, *Anomala orientalis,* larvae were starved 4 weeks. Determinations were made on the blood each week to establish changes occurring in the protein, nonprotein, amino nitrogen and free amino acid concentrations.

2. Protein nitrogen values were relatively constant during the entire period of study. Nonprotein and amino nitrogen concentrations increased approximately two-fold during the same period.

3. Twenty-one free amino acids and three derivatives were

identified by the paper chromatographic method in the blood of this insect.

4. All of the identified compounds, except tyrosine, asparagine and glutamine, increased in concentration throughout the four weeks of starvation.

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closed and the Secretary empowered to cast one ballot for the election of these officers.

Upon completion of the above business, President Dr. Asher Treat took the Chair and introduced the speaker of the evening, Dr. Roman Vishniac, who addressed the gathering on the topic: "Man in the world of Nature."

Dr. Vishniac presented his talk in essentially two parts, the first being an introductory discourse on the complexity of living things and the second being a showing of his remarkable Kodachrome slides of organisms illustrating this complexity.

The study of Biology as a science is always in a state of flux and our ideas of the nature and relationship of living things abruptly change from generation to generation. The earlier concept of classification was quite different from that of today. Living things and natural phenomena are now considered much more complicated than heretofore. The basic views are now being subjected to clarification and we have moved forward another step—that to question the origin of life itself.

The simplest living matter known today—protoplasm—is extremely complex, being made up of a systematic aggregation of numerous organic substances. How these more basic substances came into being is now under consideration. At this point Dr. Vishniac gave a brief resume of the various theses purporting to explain the origin of living matter in nature. Through experimental means some light has been thrown on the subject. Nitrites may be synthesized into amino acids by the use of ultra-violet light; in the process of cooling and condensation the miasma, during the period of the formation of the earth, carbon in the form of carbides or acetylene could possibly form nucleic acids, the building blocks of living matter; by the use of the cyclotron several isotopes of carbon may be formed from simple carbon; electrical discharges might bring about a polymerization of carbon and thus produce complex molecules; by subjecting simple basic substances to very high temperatures and pressure, complex end-products may be produced. All these are possibilities in explaining the

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first step in the formation of living matter. Still other phenomena might be involved—these yet to be discovered. It is possible that life arose by the application of several of these phenomena simultaneously. Thus a polyphyletic descent of the now living things from the primordial, might have occurred. Dr. Vishniac calculates that the one or two billion years that living matter is supposed to be in existence is not enough time for the formation of the great variety of living things we see around us today. He, therefore, supposes that the primordial living substances came into being, not all at once or in one locality but were formed, possibly in different ways and in different places in successive periods of the earth's history—indeed may be in the process of being formed today in a way similar to that in the earlier eons. Such a thesis could not only explain the great diversity and quantity of living things in the world today but might also account for the rapid evolution that took place in almost all groups of plants and animals.

The whole concept of nature is of utmost importance and interest to man. Without the other living organisms around us, we would be unable to exist. We depend upon many of them for food, clothing, shelter and protection. But more than this—living things are beautiful. With their beautiful shapes, bright colors and mathematical symmetry they are the acme of perfection. In their behavior, their courtship and reproduction they are at times most bewildering. This is the esthetic side of the picture and must not be overlooked. Indeed, were it not for our appreciation of the beauty of nature, life, after all would be rather drab.

By the use of his extraordinary colored slides, Dr. Vishniac portrayed the whole gamut of life, from crystalloid enzymes and hormones to the beautiful slime molds and protozoa, thence through the lichens, fungi, ferns and coelenterates to the flowering plants and vertebrates. Insects in flight were most remarkably illustrated and the universal interdependence of all living things was shown by a feeding praying mantis, pollinating bees, and parasitic ichneumon wasps.

A very appreciative audience applauded Dr. Vishniac's presentation of his subject.

There being no other business, the meeting adjourned at 9:30 P.M.

HERBERT RUCKES, *Secretary*, pro tem.

MEETING OF FEBRUARY 5, 1957

A regular meeting of the Society was held at the American Museum of Natural History; President Treat presiding.

The secretary was instructed to send a letter of sympathy to Dr. and Mrs. Vishniac, who were injured in an automobile accident. The Society moved unanimously to extend to Dr. Forbes, Mrs. Vaurie, and Mr. Huberman their thanks for valuable service to the Society in ordering the records and the stock of Journals.

In keeping with the tradition of the Society, the new President, Dr. Asher Treat, presented a talk on "Hearing in Insects, Birds, and Man". Dr.

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ON THE SPECIES OF MEGALOPTA DESCRIBED BY F. SMITH (HYMENOPTERA, APOIDEA)

By J. S. Moure, C.M.F.[1]

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University of Kansas, Lawrence, Kansas, U.S.A.

The genus *Megalopta* F. Smith has a quite deceptive history when one considers the way it has been interpreted by subsequent authors. Even F. Smith included in it various unrelated Halictinae whose positions are indicated below.

The most important error was made by Cockerell in 1900 when he designated *Megalopta bituberculata* as the type of the genus. It is further strange that Sandhouse (1943), when listing this species as the type, cited Meade-Waldo (1916, Ann. Mag. Nat. Hist., (8) 17: 451) as the author who made the designation. Actually, Cockerell (1900, Proc. Acad. Nat. Sci. Philadelphia, p. 374) could hardly have been more categorical. He said, "*M. bituberculata* Smith is to be regarded as the type of *Megalopta.*"

As I have already stated in another paper, Cockerell's designation is not in accord with Smith's diagnosis, which refers clearly to the female, although *bituberculata* was described from the male. This can be shown also by reference to figures 13 and 14 of Smith's plate III. The antennae have twelve segments and the drawing of the labrum shows a configuration that could only be a female. The labrum is also minutely described in Smith's generic description and attention is called to the longitudinal carina, broadened basally, a character of females. The drawing of the wing undoubtedly corresponds to *M. bituberculata,* as shown by the position of the first m–cu considerably anterior to the apex of the second submarginal cell. However, in the description the reference is evidently to the type of wing of *M. idalia.* Moreover, the name, and the indication of large ocelli in the description, are only applicable to *M. idalia.*

[1] I wish to acknowledge aid received from the National Science Foundation through the University of Kansas which made my trip to the British Museum possible. It is a pleasure also to acknowledge a travel grant (GA-BMR-5611) received from the Rockefeller Foundation for the trip to the United States. Dr. C. D. Michener assisted by translating portions of this paper into English.

For the reasons indicated above, I have no doubt whatever that *M. idalia* is automatically the type species of the genus, in spite of the earlier designations of *bituberculata.* This was also the viewpoint of Ducke, to whom I referred previously [Moure, 1943, Rev. Ent. (Rio de Janeiro), 14: 480–481].

My *Tmetocoelia,* with *Megalopta sulciventris* Friese as the type, is a synonym of *Megalopta* as here interpreted. When I erected this genus, I did so on the basis of Meade-Waldo's key (1916) which stated that the third sternite of *M. idalia* is normal or almost normal. Actually, in *M. idalia,* it is profoundly bilobed, with a deep notch between the lobes.

Equally, *Megaloptella* Schrottky, 1906, having as type *Halictus ochrias* Vachal, is a synonym of *Megalopta.* As the male of *M. idalia* runs exactly to *H. ochrias* in Vachal's key, it is probably the same species or at least a very close one.

Megaloptidia Cockerell, 1900, is a good group (genus or subgenus) among the Megaloptas. I had an opportunity to study the type species in the Carnegie Museum, Pittsburgh, and made the following notes (type number 345):

General aspect as in *Megommation,* differing principally as follows: Sternites 1 to 3 with normal, weakly recurved, margins, fourth bilobed with profound median notch and the resulting lobes quite pilose, fifth membranous and normal with the margin practically straight, sixth truncate—bilobed with the notch very superficial. The labrum has the apical angle obtuse, almost right angular, and is strongly bowed in the basal two thirds, without a median carina, broader than long (22: 16). The supraclypeal area is broader medially than the upper part of the clypeus, because of the outward curvature of the subantennal sutures which narrow the paraocular areas. The frontal line is cariniform, confined to the interantennal elevation, without entering on the frons proper. The wings are rather notably pilose, the pterostigma four times longer than broad (58: 14) and the prestigma a little longer than width of pterostigma (18: 14); the marginal cell is quite elongate and tapering in the free part, four times as long as broad (128: 30), and the apical free part almost twice as long as basal part occupied by the submarginal cells (90: 40); distance to wing tip, taken from a line perpendicular to apex of cell, about a third of length of cell (44: 128); first submarginal cell longer than the two following

together (proportions on vein M 60 : 18 : 34) ; second submarginal cell smaller, higher than long and receiving first m–cu at its apex; hamuli 10 on each wing.

I was able to find in the Hope Museum, Oxford University, the type of *Halictus insignis*. This species was designated as the type of *Megommation*. The specimens on which I based the generic description are conspecific with the type, and also with material of *Megalopta* (*Megaloptella*) *ipomoeae* Schrottky, whose synonymy I can now confirm. It is noteworthy that Bates refers to nesting of *Megalopta ianthina* Smith in branches of trees while nests of *Megommation insigne* (Smith) in the soil were found by C. D. Michener and R. B. Lange.

Ariphanarthra continues as an aberrant group of Megaloptas, distinguished by highly specialized characters, especially the greatly elongated palpi to which I called attention in my paper of 1951 (Dusenia, 2: 139).

Considering the species described by Smith, the following descriptions and comments show present generic positions, as well as some new synonymy. New generic and subgeneric names are proposed for two of them, *M. bituberculata* and *M. ornata*.

1. *Megalopta idalia* Smith, 1853

Type female: 17.a.1276. British Museum.

SIZE: Length 11.20 mm.; wing, including tegula, 9.20 mm.; head and abdominal widths 2.85 mm. and 3.80 mm.

Basal area of propodeum a little shorter than metanotum, smooth, limited by a very thin, delicate carina. Eye length more than twice upper interorbital distance, and this less than lower interorbital distance (112:51:69 and maximum interorbital distance 80)[2]; interocellar distance almost four times ocellocular distance and slightly longer than transverse diameter of median ocellus (19: 5: 17); ocelloccipital distance almost equal to interocellar, but a little shorter than orbitoccipital distance as measured in dorsal view (20: 19: 23); clypeal length almost half of clypeocellar distance (42: 78); interalveolar[3] distance shorter than alveolorbital (13: 18), but alveolocellar as long as subantennal suture (35: 35); proportional lengths of scape, pedicel and four basal segments of flagellum as 65: 8: 10: 8: 11: 12 and maximum diameter of flagellum 12.

Type locality: Santarém, Pará, Brasil (53/60).

[2] All the measurements were made with 50 times magnification, and 1 division of the micrometric oculer corresponds actually to 20 microns (μ), or if multiplied by 0.02, to millimeters.

[3] The alveoli concerned are the antennal sockets.

2. *Megalopta purpurata* Smith, 1879.

Type male, 17.a.1273. British Museum.

SIZE: Length 13.40 mm.; wing, including tegula, 12.60 mm.; head and abdominal widths 3.58 mm. and 3.60 mm.

Brown-ferruginous, with some metallic bronze reflections on head, sides of mesoscutum, scutellum, episterna and propodeum. Pubescence long and fuscous, but pale on genae, propodeum, and ventral side. Propodeum bowed, with a short (less than half length of metanotum), shining, shallowly micro-reticulate basal area. Third sternite deeply notched, bilobate, the notch deeper on fourth sternite, at its bottom with a strong, almost perpendicularly raised spine and lobes projected in a point backwards and with outer sides emarginate; fifth sternite membranaceous, slightly emarginate on its middle, the emargination a little deeper on sixth.

Eye length less than twice upper interorbital distance, but almost twice lower interorbital distance (120: 74: 62 and maximum interorbital distance 96); interocellar distance a little longer than ocellorbital, and almost equal to transverse diameter of median ocellus (18: 13: 17); ocelloccipital distance longer than interocellar, and equal to ocelloccipital distance (22: 18: 22); clypeal length conspicuously longer than half clypeocellar distance (44: 75); interalveolar distance a little longer than alveolorbital (18: 15), and alveolocellar slightly shorter than subantennal suture (32: 33). Antennae missing.

Type locality: Tefé (= Ega), Amazonas Brasil. (70/16)

3. *Megalopta ianthina* Smith, 1861

Augochlora calliope Cockerell, 1905, Entomologist, 38: 37 (new synonym).

Type female, 17.a.1023. British Museum. Type female of *A. calliope* 17.a.1031, in the same Museum.

This species and the following one can be distinguished from any other *Megalopta* by having a relatively large head and small ocelli. Color separates *ianthina* from *nigrofemorata* at first sight.

Postocellar sulci very conspicuous. Punctures very small on the posterior disc of mesoscutum, interspaces polished and 7 to 10 times puncture diameter. Basal area of propodeum half length of metanotum with weak radiating rugulae all over its surface. Basitibial plate small, weakly margined; inner hind tibial spur pectinate with four spines.

Eye length almost equal to upper interorbital distance and shorter than lower interorbital distance (109: 104: 117 and maximum interorbital distance 125); interocellar distance less than ocellocular, but almost twice transverse diameter of median ocellus (23: 29: 12); ocelloccipital distance almost twice interocellar, but a little shorter than orbitoccipital distance (43: 23: 47); clypeus much shorter than half clypeocellar distance (32: 85) and almost four times broader than long; interalveolar distance much

shorter than alveolorbital (23: 38), but alveolocellar conspicuously longer than subantennal suture (43: 30); proportional lengths of scape, pedicel and five basal segments of flagellum as 74: 8: 11: 10: 11: 12: 13 and maximum diameter 12.

Measurements of the same distances on the type of *calliope* demonstrate conspicuous allometry. They are as follows: Eye length, upper lower and maximum interorbital distances as 98: 79: 85 and 95; interocellar, ocellocular and transverse diameter of median ocellus as 20: 20: 10, and vertex notably shorter than on type specimen of *ianthina* as shown by ocelloccipital and orbitoccipital distances respectively 25: 27. Clypeal length and clypeocellar distance as 31: 75, and clypeus only three times broader than long; interalveolar distance shorter than alveolorbital (17: 25) and alveolocellar longer than subantennal suture (39: 27); proportional lengths of scape, pedicel and four basal segments of flagellum as 60: 8: 10: 8: 10: 11 and maximum diameter 11. Size: Length 9.8 mm.; wing, including tegula, 8.55 mm.; head and abdominal widths 3.04 mm. and 3.45 mm.

Type locality for both *ianthina* and *calliope:* Tefé (= Ega), Amazonas, Brasil. The specimen labelled *M. ianthina* is from Smith's collection, the other is numbered 58/6.

4. *Megalopta nigrofemorata* Smith, 1879.

Type female: 17.a.1020. British Museum.

SIZE: Length 9.60 mm.; wing, including tegula, 8.80 mm.; head and abdominal widths 3.4 mm. and 3.68 mm.

Eye length exceeding upper interorbital distance, almost equal to lower one (100: 88: 95 and maximum interorbital distance 98); interocellar distance shorter than ocellocular distance and a little less than twice transverse diameter of anterior ocellus (19: 25:11); ocelloccipital distance shorter than orbitoccipital but conspicuously longer than interocellar distance (27: 32: 19); clypeus a little shorter than half clypeocellar distance (35: 78), its width 2.6 times its length; interalveolar distance shorter than alveolorbital distance (20: 29) and alveolocellar distance much longer than subantennal suture (42: 28); proportional lengths of scape, pedicel and four basal segments of flagellum as 65: 8: 10: 8: 10: 11.5 and maximum diameter of flagellum 11.5.

Radiating rugulae of basal area of propodeum weaker than in *ianthina*, and punctures of tergites shallower. Lateral corners of pronotum a little less produced.

Type locality: Tefé (= Ega), Amazonas, Brasil. (70/16).

Megaloptodes new genus

Type species: *Megalopta bituberculata* F. Smith, 1853.

The systematic relations of this species are not very evident. The supraclypeal area and, principally, the clypeus, are very

flat thus differing from other members of the *Megalopta* group. Even more distinctive is the lack of a pre-episternal sulcus on the mesepisternum. The pronotum is completely rounded all the way to the lobes without vestiges of the pronotal crest nor of the humeral angles. Although in *Megommation* and *Megaloptidia* the pronotum also lacks a crest, the humeral angles are clearly evident. This character is emphasized in *M. bituberculata* because the mesoscutum is truncate anteriorly and not arcuately procurved as in *Megalopta* and the groups mentioned above.

Another point that indicates separation from the Megaloptas is the aspect of the wing venation. The free apical part of the marginal cell in *Megaloptodes* is approximately equal to the basal part occupied by the submarginal cells, while in the Megaloptini (Moure, 1943) the free part is about twice as long as the part occupied by the submarginal cells.

Equally, the sterna without any modification and the last tergite which is truncate—bidentate are found exclusively in *Megaloptodes,* as are the two notable scutellar tubercles.

Knowledge of the female would clarify the position of the genus. Also, study of the genitalia might give indications of its relations. However, since the type is a unique and in none too good a state of preservation, I decided not to attempt a dissection.

MALE.—Punctures small and shallow. Without yellow marks and almost without metallic reflections. Tergites without basal or marginal bands of tomentous pubescence, or fringes of bristles.

a) Head moderate sized; face rather narrow; gena in profile narrower than eye and rounded.

b) Labrum rather short and broad (50: 30), apex almost right angular, without median carina, and labral plate reduced to a vestigial rounded transverse basal carina. Labial palpi long, first segment as long as three following together; maxillary palpi a little longer than apical part of galea and this less than half length of eye (47: 116). Mandibles mucronate, simple.

c) Clypeus flat, slightly broader than long (58: 50), with a shallow median carina, projecting but little below lower orbital tangent, but surpassing and overhanging labro-clypeal articulation; lateral parts of epistomal suture diverging downwards and almost touching orbits. Supraclypeal area very weakly bowed, parallel-sided, almost twice as broad as paraocular area. Frons much shorter than clypeus and the frontal line shallowly sulcate, not carinate. Antennal alveoli closer to orbits than each to the other (15: 22), placed on upper third of face, with alveolocellar

distance as long as subantennal suture (30: 30). Malar area almost linear, one fortieth of eye length.

d) Eyes practically glabrous, large, slightly emarginate, converging in upper forth. Eye length almost twice upper interorbital distance and this slightly longer than lower interorbital distance (116: 65: 60 and maximum interorbital distance 83). Ocelli rather moderate sized, their diameters a little more than antennal alveolar diameters; interocellar distance longer than median ocellar diameter and twice ocellocular distance (22: 15: 10). Vertex short and rounded; postocellar sulci almost vestigial.

e) Scape longer than alveolocellar distance (45: 30) or than pedicel and two basal flagellar segments together (45: 8: 13: 20); second flagellar segment almost twice as long as its diameter; other segments missing.

f) Pronotum without crista and lateral laminae, rounded and just applied to mesoscutum, without humeral angles and without antero-lateral carinae. Mesoscutum not produced, truncate-rounded in front; median line, prescutal (notauli) and parapsidal sutures very shallow. Mesepisterna with preepisternal suture inconspicuous. Scutellum bituberculate, tubercles broad low cones.

g) Tegula of medium size, not dilated posteriorly. Pterostigma rather narrow (50: 15), prestigma wide and short (12: 10); marginal cell rather narrow (108: 25) and distance from its apex to wing tip more than half length (108: 74). Third submarginal cell longer than first, second the smallest, subquadrate, proportional lengths on M as 47: 16: 53; first m–cu in apical third of second submarginal cell, and second m–cu three tenths from apex of third submarginal cell (or 5 and 15 from apex respectively). Hamuli 11 per wing.

h) Legs normal. Proportional lengths of femur, tibia, and basitarsus of second pair as 80: 62: 61; of third pair as 100: 106: 83; no basitibial plate; a dense fringe of medium-sized hairs on distal half of inner side of middle tibia.

i) Propodeum short, bowed. Basal area very conspicuous and with some irregular rugae, limited by a sharp thin carina. Postero-lateral carinae very short, upper postero-lateral angles rounded.

j) Abdomen broad, sides subparallel; tergites with broad sub-membranous marginal depressions, wider on middle, rather narrow on first tergite. Seventh tergite broadly truncate, with a small tooth on each side. Six visible sternites, normal, neither emarginate or depressed; graduli present at least on second, third, and fourth sternites.

5. **Megaloptodes bituberculatus** (Smith, 1853) new combination

Megalopta bituberculata Smith, 1853, Cat. Hym. Br. Mus., 1: 84

Type male: 17.a.1275. British Museum.

SIZE: Length 11.6 mm.; wing, including tegula, 9 mm.; head and abdominal widths 3.28 mm. and 3.65 mm.

Face and thorax rather densely plumoso-pubescent. Scutellum bituberculate, almost as in *Rhathymus*.

Type locality: Amazonas, Brasil. From the F. Smith collection.

6. *Neocorynura pilosa* (Smith, 1879)

Megalopta pilosa Smith, 1879, Descr. N. Sp. Hym., p. 48.
Type female: 17.a.1024. British Museum.

SIZE: Length 8.4 mm.; wing, including tegula, 7.4 mm.; head and abdominal widths 2.4 mm. and 2.7 mm.

Eye length much longer than upper interorbital distance, this longer than lower interorbital distance, but shorter than maximum interorbital distance at emargination (80: 61: 54: 85); interocellar distance shorter than ocellocular, but larger than transverse diameter of median ocellus (13: 18: 9); ocelloccipital distance longer than interocellar but a little shorter than orbitoccipital (17: 13: 23). Clypeal length less than half clypeocellar distance (31: 66), 1.7 times broader than long. Interalveolar distance a little less than alveolorbital (16: 20), and alveolocellar slightly longer than subantennal suture (30: 28). Proportional lengths of scape, pedicel, and four basal articles of flagellum as 54: 8: 8: 6: 9: 10, maximum flagellar diameter 12.

Pronotum with humeral corners strongly salient. Mesoscutum strongly produced forward and bilobate. Metasoma moderately claviform. Color and pubescence as in Smith's description. Punctures on clypeus and supraclypeal area larger than on frons, but smaller than on disc of first tergite, interspaces polished on apical half of clypeus and larger than punctures, of the same size and reticulate above, and duller on supraclypeal area. On mesoscutum punctures very crowded and uniform, on scutellum finer and shallower with some large punctures scattered; on first tergite large and deep on disc, smaller and closer towards borders; on following tergites dense and small.

Type locality: São Paulo de Olivenca, Amazonas, Brasil (70/16).

In my collection is one specimen from Tingo Maria, Perú.

7. *Neocorynura cuprifrons* (Smith, 1879)

Megalopta cuprifrons Smith, 1879, Descr. N. Sp. Hym., p. 49.
Type female: 17.a.1025. British Museum.

SIZE: Length 8.8 mm.; wing, including tegula, 7.7 mm.; head and abdominal widths 2.6 mm. and 3.0 mm.

Pronotum with humeral angles and anterior part of mesoscutum as in *N. pilosa*. Inner hind tibial spur pectinate with 5–6 spines. Punctures very dense (interspaces cariniform) on frons, mesoscutum and mesepisterna; larger and sparser on clypeus and supraclypeal area, interspaces as large as punctures, polished and shining; on scutellum a little smaller and sparser than on mesoscutum, with some larger punctures scattered; on propodeum punctures large as on clypeus, interspaces as large as punctures

and covered with very fine punctures; on first tergite deep and large on disc, sparser towards base, denser and smaller towards posterior margin and sides; on second tergite slightly smaller than on mesoscutum, deep and very crowded, on third and following tergites much smaller. Basal area of propodeum with numerous (24–26) regularly radiating striae, median ones with apices bifurcate.

Eye length longer than upper interorbital distance and this greater than lower interorbital distance, but maximum interorbital distance longer than eye (85: 65: 57: 92). Interocellar distance shorter than ocellocular, greater than transverse diameter of median ocellus (14: 18: 9); ocelloccipital distance greater than interocellar distance but shorter than orbitoccipital (19: 14: 25). Clypeal length half clypeocellar distance (34: 67), 1.5 times as broad as long. Interalveolar distance shorter than alveolorbital (17: 22) and alveolocellar distance (between closer borders of antennal sockets and median ocellus) longer than subantennal suture (32: 28). Proportional lengths of scape, pedicel and four basal segments of flagellum as 57: 8: 7: 8: 9: 10 and maximum diameter of flagellum 13.

Type locality: São Paulo de Olivença, Amazonas, Brasil (70/16).

8. *Augochloropsis* (*Augochloropsis*) *vivax* (Smith, 1879)

Megalopta vivax Smith, 1879, Descr. N. Sp. Hym., p. 48.

Type female: 17.a.1224. British Museum.

SIZE: Length 8.4 mm.; wing, including tegula, 6.26 mm.; head and abdominal widths 2.6 mm. and 2.8 mm.

Vertex rounded. Humeral corners of pronotum salient, with a small outer emargination; lateral carina expanded in a broad lamina with a small sinuosity a little before outer emargination, partially translucent and ending in an acute angle on lobes. Mesoscutum broadly shining on disc (interspaces sometimes large as 5 diameters of punctures and with a shallow micro-tessellation), punctures denser toward sides and forward, and very crowded and coarse on anterior corners as on frons; rough and shallower on lower paraocular areas, much sparser on clypeus and supraclypeal area (interspaces shining and 2 to 5 times broader than punctures), with some transverse rugae on upper half of supraclypeal area; on mesepisterna deeper, on metepisterna finer and denser, also on proximal part of propodeum, but sparser backward and downwards; postero-lateral angles of propodeum broadly polished and posterior surface shining but with scattered deep punctures; moderately strong on sides of first and second tergites, shallower on discs and sparser toward bases; marginal depressions on first and second tergites smooth, on third and fourth with a median area finely and densely punctured, leaving a narrow smooth fascia on basal and marginal border of these depressions. Legs pale-brownish, with some green reflections on tibiae, conspicuous on anterior ones. Inner hind spur pectinate with six teeth, the spur broadened at base. Marginal pale fringes on first and second tergites very well developed, on first larger than marginal depression, on second a little shorter in middle and at extreme

sides, the two fringes of the same length (9) and uniform. Semierect black bristles on discs of tergites 2 to 5, most conspicuous on the third. Basal area of propodeum semilunar with strong uniform radiating striae (about 26).

Eye length longer than upper interorbital distance, and this longer than lower one, but maximum interorbital distance longer than eye length (81: 75: 63: 90). Interocellar distance a little shorter than ocellocular, but longer than twice transverse diameter of median ocellus (20: 23: 9). Clypeal length half of clypeocellar distance (as measured between upper part of epistomal suture and lower border of median ocellus) (30: 60). Interalveolar distance shorter than alveolorbital (19: 21), but alveolocellar distance twice as long as subantennal suture (35: 18). Proportional lengths of scape, pedicel and four basal segments of flagellum as 46: 7: 8: 6: 7: 8 and maximum flagellar diameter 10. Frontal carina shorter than distance to median ocellus (18: 23). Anterior edge of clypeus with a strong tooth on each side.

Type locality: Pará, Brasil. N. 70/16.

A. atropos is a very different species by having denser puncturation on mesoscutum, and interspaces two to three puncture diameters in width, reticulate and duller, pronotal corners obtuse without lateral notch, and vertex transversely roof-shaped.

Augochloropsis (Glyptochlora) new subgenus

Type species: *Megalopta ornata* Smith, 1879.

This subgenus has points of similarity to the subgenus *Glyptobasia,* which it resembles by the foveate puncturation (even coarser than in that subgenus) and by the form of the propodeum, whose lateral posterior carinae unite in a transverse carina closing the area of the propodeum posteriorly. In *Glyptobasia* the vertex is rounded and not roof-shaped, and the marginal depressions of the abdominal terga are normal and with fringes of coarse bristles on the first and second terga.

FEMALE.—Metallic; with very large and deep punctures on frons, thorax and propodeum, on mesoscutum and scutellum with diameters of 0.02 mm.; without marginal bristle-fringes ("vibrissae") on first and second tergites.

a) Head much as in *Augochloropsis* s. str., face between orbital sinuses broader than eye length (98: 108); gena in profile as broad as eye, sharply margined.

b) Labrum elongato-cuspidate, its basal half occupied by a thick bituberculate labral plate, distal half membranous, subsemicircular, surmounted by a carina projecting beyond apex and on its borders with some short upturned bristles. Labial and maxillary palpi normal, short. Apical part of galea one fifth of eye length (100: 20). Mandible bidentate, apical

tooth broad, inner one much smaller, a small emargination on inner margin, simulating a third tooth.

c) Clypeus and supraclypeal area bowed; clypeus projecting a little beyond lower orbital tangent, almost twice as broad as long; epistomal suture evenly bent and lower clypeal corner separated from orbit by half an ocellar diameter. Frons longer than clypeus (50: 42), frontal line carinate on its distal half. Antennal alveoli slightly closer to each other than to orbits (22: 25), placed almost on middle of face, and alveolocellar distance much longer than subantennal suture (37: 24). Malar area linear.

d) Eyes glabrous, with inner sides sinuate. Ocelli normal, interocellar distance equal to ocellorbital, and about twice median ocellar diameter. Vertex sharply transversely roofed, posterior ocelli one diameter from crest of vertex, posterior surface steep and slightly concave; without postocellar sulci.

e) Scape very long (163), surpassing vertex; second flagellar segment a little shorter than third, but together longer than first (11: 8: 9: 11 and diameter 14).

f) Pronotum with crista concave in middle, meeting at an obtuse angle the very broad straight lateral lamina, which ends in a right angle on pronotal lobe; antero-lateral carina present, beginning at dorso-lateral angles and going down. Mesoscutum produced forward in an up-turned, medially notched, lamina; median line and parapsidal sutures narrow, sharp and straight. Pre-episternal suture formed by a row of pits a little larger than punctures. Scutellum normal.

g) Tegula elongato-elliptic. Pterostigma almost four times longer than broad (50: 13); prestigma twice as long as broad (15: 7); marginal cell shortly appendiculate, a little less than four times its width (95: 27) distance from its apex to wing tip more than two thirds of its length (95: 70). First submarginal cell as long as second and third together (on marginal cell 54: 17: 37), second the smallest, subquadrate, receiving first m–cu at its end, and second m–cu one seventh of its length from apex of third. Hamuli 11 per wing.

h) Legs normal; second basitarsus slightly shorter than tibia (70: 60); hind tibia much shorter than tarsal segments together, and basitarsus three fourths of tibial length (220: 160: 90); basitibial plate absent; inner hind spur pectinate, with 7 to 8 teeth; femoral scopa strongly developed, dense, tibial scopa short but dense.

i) Propodeum with its posterior face subquadrate, outlined by a strong sublaminate carina; horizontal area smooth, well developed, defined by strong upper and postero-lateral carinae and enclosing the basal semilunar area, slightly depressed, with a median strong carina and some weaker radiating ones (about 18).

j) Tergites 1 and 2 without marginal fringe of bristles; marginal depressions very wide and broadened medially, on third tergite occupying more than two thirds of exposed portion. First sternite strongly carinate on its basal third, and its margin slightly recurved; margin of second straight, of third to fifth broadly procurved; graduli present only on second and third sternites.

9. *Augochloropsis* (*Glyptochlora*) *ornata* (Smith, 1879)
Megalopta ornata Smith, 1879, Descr. N. Sp. Hym., p. 49.
Type female: 17.a.1274. British Museum.

SIZE: Length 10.0 mm.; wing, including tegula, 9.0 mm.; head and abdominal widths 3.12 mm. and 4.0 mm.

Type locality: São Paulo de Olivença, Amazonas, Brasil (70/16).

Augochloropsis refulgens (Smith, 1861) (Type ♀ 17.a.1245) [= *A. deidamia* Smith, 1879, type ♀ 17.a.1253] shares some characters with *A. ornata*, as the sharply roofed vertex, broadly expanded lateral lamina on pronotum, and lack of fringe of bristles on the first and second tergites, but the mesonotum, propodeum and marginal depressions are normal as in *Augochloropsis*.

Augochloropsis atropos (Smith, 1879) [Type ♀ 17.a.1254] is also closely related to *refulgens*, but has well developed marginal fringes on the first and second tergites.

(*continued from page 178*)

Treat began with an explanation of the lateral line sensory mechanism of fish. The lateral line enables fish to locate the source of moving objects which are not themselves in direct contact with the fish. From this type of hearing mechanism, two main lines of evolution, one for amphibians and another for reptiles, birds, and mammals, have evolved . . . in relation to the aquatic or terrestrial habitats.

Among insects, including most of the orthoptera, many hemiptera, and lepidoptera, the basic mechanisms of hearing are quite unlike those of any vertebrate. Insect tympanic organs are sensitive not to pressure changes as such, but to actual mechanical movements of the tympanic membrane, or, in other words, to the actual particles which move the membrane. Dr. Treat drew upon his own work on hearing in noctuid moths to explain some of the neurophysiological aspects of insect hearing. The noctuid moth has only 2 sense cells associated with the tympanic membrane. Although certain noctuid moths have a great range of frequency sensitivity, extending up to well over 100,000 cycles per second, they cannot discriminate different frequencies, and could never be "out of tune". The minimum energy necessary to excite the noctuid tympanic mechanism is roughly comparable to that in vertebrates—which is about the maximum sensitivity that could exist before simple Brownian movement of particles in the auditory mechanism would excite the sensory cells. Dr. Treat showed slides of the nerve impulse messages recorded from the sensory cells in the noctuid auditory organ.

(*continued on page 222*)

THE CORRESPONDENCE BETWEEN WILLIAM HENRY EDWARDS AND SPENCER FULLERTON BAIRD. PART I.*

ANNOTATED BY F. MARTIN BROWN

Some years ago while visiting with the late Dr. Austin Clark and his charming wife in their Washington, D. C., home the conversation turned to my interest in the history of American entomologists. Mrs. Clark, who has recently retired as Librarian of the Smithsonian Institution, suggested that when the Baird papers were accessible they might yield some interesting correspondence between Edwards and Baird. None of the three of us that evening realized how prophetic Mrs. Clark's statement was to be. Since that time the Smithsonian Institution has built a vault to hold its archives and the Baird papers have been put in order. Through the good offices of Mrs. Clark and Mr. Everard De Atley, archivist of the Smithsonian, I have been able to read and organize the entire Edwards-Baird correspondence.

The letters from Edwards and other correspondents to Baird are bound in annual volumes. They are arranged alphabetically in groups by the writers' surnames and within a group by date. These are relatively easy to read although at times the binding has obscured a line or so of script. The letters from Baird to his correspondents are in copybooks. The copy was transferred from the original letter by pressing a moist piece of tissue paper against the letter. Reading them is a task of an entirely different order! Some of them were made with the tissue too wet and a badly smeared copy resulted. Others were made with too dry tissue and only a bit of a letter here and there made a bold transfer. Most of the letters fall between these extremes and are reasonably legible.

Mr. De Atley had microfilms prepared for me of all of the letters involved. The great majority of these I enlarged from the 35 mm. rolls of film to four by five inch photographic prints. A few were printed by the Eastman Recordak method through the good offices of Mrs. Dolores Renze, State Archivist for Colorado. The prints were then transcribed and the typescript of the entire collection put into chronological order. Mr. Cyril dos

* Published with the permission of the Secretary, Smithsonian Institution, Washington, D. C.

Passos has checked my reading of most of the letters. There still are a few words in some of the Baird letters that defy both of us.

My greatest problem has been how to present the material in these letters so other entomologists may derive the maximum benefit from them. I have come to the conclusion that the best thing to do is to publish them in their entirety and to annotate them to the best of my ability. The next decision to be made was how to publish this mass of important material. Commercial publication was out of the question. Too few copies are needed to satisfy the limited market for such a book to interest any publisher. The Smithsonian Institution has such limited funds for publication that it was felt unreasonable to devote any to the publication of material with such a restricted appeal as these letters. However, the Secretary of the Institution was "pleased to give its [the Institution's] permission for such a worthwhile effort to be published in the Journal of the New York Entomological Society."

Several little or unknown interesting facts developed as I began to work with this material. I doubt that any entomologist previously realized the great part that Spencer Fullerton Baird played in the development of our science in America. It does not take much reading of these letters to demonstrate how great an influence he had upon William Henry Edwards who is acknowledged the greatest rhopalocerist yet to develop in this country. Baird supplied Edwards with masses of material, put him in contact with collectors over the entire continent, helped him to solve knotty taxonomic problems and above all gave him advice and encouragement to produce *The Butterflies of North America,* Edwards' masterpiece. The title for this magnificent work was suggested by Baird.

From this point on I let the two great naturalists speak to you in their own words written a century ago.

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Newburgh, New York
13th Oct. 1859

* Numbers in the upper left hand corner of a letter received by Baird refer to the index numbers placed upon the letter in the Smithsonian Archives. No earlier correspondence between Edwards and Baird than this letter has been found thus far in the files. It is obvious that there was earlier correspondence.

Dear Sir.

Much obliged to you for your kind recollection of me in the matter of Kirby[1]. I ordered the book at once from Waterman.[2]

Can you give me the name of any entomologist in Canada who will be a good one to exchange with?

Yours truly
W. H. Edwards

Prof. S. F. Baird
Washington

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Newburgh. 13th Nov. 1859

Prof. Baird

Dear Sir.

I have put up a box of Panama crustaceans for Mr. Stimpson,[3] and will forward them from New York in a day or two. With these are some insects in a small box for Mr. Drexler.[4]

Yours truly
W. H. Edwards

2582* 213*

Nov. 17 59

Dear Sir

The box of specimens was duly received. Mr. Stimpson begs particularly

[1] William Kirby (1759–1850): Fauna boreale-Americana, or the Zoology of the Northern Parts of British America, containing descriptions of objects of natural history collected on the late northern land expedition, under command of Captain Sir John Franklin, by John Richardson. Part IV. The Insects, by W. Kirby. London. Longman, London. 1837.

[2] A bookseller in New York, N. Y. (?) or Philadelphia, Penna. (?) The name may be Waterman or Westerman.

[3] William Stimpson (1832–1872): marine biologist, naturalist of the North Pacific Exploring Expedition, 1852–1856; Smithsonian Institution, 1856–1865; director, Chicago Academy of Science, 1865–1871. See DAB 18: 31–32.

[4] Constantin F. Drexler (–): taxidermist, and sometime field collector for the Smithsonian Institution, often assigned to U. S. Army parties as hospital steward for "housekeeping" purposes. He became a member of the Entomological Society of Philadelphia on December 26, 1859. An account of his collecting activities is in preparation.

* The number at the upper left refers to the serial number in Baird's correspondence for the year. Later each year was not separately numbered. The numbers in the upper right refer to the copy-book page upon which a "press" of the letter was made and from which the text presented was transcribed through the medium of microfilm.

to know whether the crabs were collected at Aspinwall[5] in Panama. He was much pleased with them.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh

2559? 252

November 23 59

Dear Sir.

Glad the butterflies[6] were interesting. I sent another lot just received from Red River Settlements of the North.[7]

Sincerely yours
S. F. Baird

W. H. Edwards
Newburgh

P.S. I want you to do your bit to furnish funds to Kennicott[8] even more than you promised. I have just had a letter from him at Methy Portage.[9]

[5] Aspinwall, Panama, is the former name of the Caribbean terminal of the trans-isthmus railroad. The locality is now within the confines of Colon, Canal Zone.

[6] The letter of transmittal and Edwards' reply referred to in 2559? are missing from Baird's files. These butterflies may have been some collected by Drexler in Washington, D. C., or in the West. The insects sent for Drexler mentioned by Edwards in letter 478, 13 November 1859 may have been a return exchange.

[7] The Red River of the North flows northward from the boundary between Minnesota and South Dakota to Lake Winnipeg, Manitoba. It forms the boundary between North Dakota and Minnesota. The Red River settlements of the late 1850s are those that were founded by Lord Selkirk in 1811 in the vicinity that has now developed into Winnipeg, Manitoba. In the Annual Report of the Smithsonian Institution for 1859 are two references to material received from the Red River of the North. On p. 74 is: *"Gunn, Donald*—Skins of birds and mammals from North Red River."; on p. 75 is *"Chas. A. Hubbard*—Skins and eggs of birds from Red River of North." Either may have been the source of the butterflies. I prefer Hubbard since he accompanied Kennicott as far as Lake Winnipeg and then returned (Annual Report for 1859, p. 66).

[8] Robert W. Kennicott (1835–1866): naturalist-explorer of the North; founder of the Chicago Academy of Sciences. At the time of this letter Kennicott was northward-bound on an expedition jointly financed by the Smithsonian Institution, University of Michigan, Audubon Club of Chicago, the Chicago Academy of Sciences and several private persons. See DAB 10: 338–339.

[9] Methy Portage (109° 45′ W. Long., 56° 35′ N. Lat.) is in western Saskatchewan near the Alberta border. It is the trail over the height of land separating the Arctic and Hudson Bay watersheds between Lake Methy

He is to /* stay four years in the North. With funds at his command: one whole year on the Yukon in Russian America.

406

Newburgh, New York
Nov. 29, 1859

Prof. Baird

Dear Sir.

Yours of 23rd was duly rcd. and the box came today. The butterflies[10] were all ruined, every one of them, but it was no great matter as they were all of our common varieties. We will look for better luck next time when the Californian insects[11] come along.

With regard to Kennicot's prolonged stay, I will give $50 per year so long as he remains exploring if you will send me his collections of / lepidoptera as received. I suppose this form of annual subscription is what you wish for. It is the most convenient to me and to others probably.

Yours truly
W. H. Edwards

479

Newburgh, New York
19th Dec. 1859

Dear Sir.

The box of Rocky Mountain lepidoptera[12] came duly. The specimens

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and the Clearwater River, a tributary of the Athabaska River. La Loche Mission is situated on the east shore of Lake Methy.

* Here and hereafter this symbol, /, is used to indicate the end of a page of manuscript in the original letter.

[10] From the Red River Settlements of the North.

[11] There is no mention of Californian material in any of the letters presently known in the Edwards-Baird correspondence. This may refer to material being shipped via the Smithsonian from one of the many collectors associated with the U. S. Army in California; the exchange of material with Edouard Ménétriés, (1802–1861) at St. Petersburgh, Russia (see dos Passos, "The Entomological Reminiscences of William Henry Edwards" J. New York Ent. Soc. 59: 129–186, 1951, esp. pp. 137–138); or from Dr. Herman Behr of San Francisco via the Smithsonian.

[12] Edwards' letter of 7 April 1860 (q.v.) suggests that this material came to him from Drexler. However the true origin is not certain. The list of donations made in 1859 included in the Annual Report for that year contains reference to three collections from which these may have come. On p. 73: *"H. Brandt*—Box of insects, reptiles and mammals, Kansas." On p. 76: *"Lt. John Mullan, U.S.A.*—Three boxes zoological and geological collections made by John Pearsall on the Upper Missouri," and *"Captain W. F. Raynolds, U.S.A.*—"Zoological collections made in the Upper Missouri region by Dr. F. V. Hayden." On the basis of the specimens listed we can set aside the Brandt material, neither *Argynnis Zerene* nor *Melitaea Editha*

having been crowded into small full boxes were greatly broken and rubbed, but I have succeeded in spreading them out into very decent shapes.

The varieties are

Papilio Eurymedon
Argynnis Aphrodite
Argynnis Zerene
Melitaea Editha
Melitaea Tharos
Attacus Cecropia

of Mel. Editha there were a dozen specimens or so, and they constituted the / bulk of the collection.

Much obliged to you and shall be glad to see any thing more in same line.

Truly yours
W. H. Edwards

Prof. Baird

543 126

Feb. 28 60

My Dear Sir.

I would be glad to receive from you the 50.00 you subscribed for Kennicott as I must soon begin to think of forwarding to him. You will receive the lepidoptera of the Yucon collection. Mr. Kennicott will want to have a series of the duplicates, however, if any to spare.

We think somewhat of sending Drexler to south end of Hudson Bay this spring. Do you want any Lepidoptera from there? How would you like to pay 25.00 for these! The collections should be different from Kennicotts, who / is on the Mackenzies River and interior of Russian America.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

407

Newburgh, New York
1 March 1860

Prof. S. F. Baird
Dear Sir.

I have your letter of 28th ult. I will enclose in this the fifty dollars for Kennicott. I will be very glad to receive the collections he makes and will preserve the duplicates as you desire.

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are found in the area just west of Denver which was the Rocky Mountain area of Kansas in 1859. The same reason dictates that Hayden did not collect these specimens in the Montana area visited in 1859. John Pearsall, Mullan's naturalist, was a founding member of the Entomological Society of Philadelphia and he may very well have collected just this material in the Bitterroot Mountains on the border of Idaho and Montana, where he was during 1859.

I will go in for Drexler's expedition to extent of $25, if you send him, if I can have the butterflies and sphinges as in Kennicott's case. I see that Prof. Chadbourne[13] of Williams College is about to head another expedition to Labrador the coming summer. If so, he will glean part of the field Drexler would enjoy.

I enclose a note to Drexler about his chrysalides now on hand, which he had better turn over to me if he goes away.

I received a letter from Cyrus Thomas[14] of Illinois, Curator of the N. H. Society respecting naming their butterflies.[15] I promised to do so, and expect large returns from them for which I have to thank you.

Do you know any way by which the Lepid. of New Mexico and Western Texas can be reached? If I can't get them in any other way I shall apply to entomological friends and try to organize an expedition there for next year.

Yours truly
W. H. Edwards

614 178

March 6 60

Dear Sir.

I have the pleasure of acknowledging the receipt of $50.00 subscription to Kennicott for 1860. What ever may be the number and value of the Lepidopteras received by you from Kennicott. Your aid will be very considerable in accomplishing the general objects of the expedition.

Much obliged for the subscription of 25.00 to Drexlers exped. He will leave towards the end of April in all probability. Prof. Chadbourne's expedition will not interfere / with Drexler's ground. He goes overland from Montreal to James Bay and will be in quite a different region from the Labrador party.

I gave your letter to Drexler. He will write you.

I have friends at Military forts in the west who will aid any one sent out by us to collect Lepidoptera, etc. If Drexler does satisfactorily this time he can go to Fort Massachusetts[16] or Cantonment Burgwyn[17] next Spring. All we want is the funds.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh

[13] Paul Ansel Chadbourne (1823–1883): educator and naturalist; professor of botany and later of natural history at Williams College, Williamstown, Massachusetts, 1853–1867; president, University of Wisconsin 1867–1870; president of Williams College 1871–1881. See DAB 3: 585. Edwards was a member of the class of 1842 at Williams College.

[14] Cyrus Thomas (1825–1910): entomologist and ethnologist, founder of the Illinois Natural History Society; State entomologist for Illinois 1874–1882 (?); Bureau of Ethnology, Washington, D. C., 1882–1910 (?). See DAB 18: 426.

830 341

March 25 60

Dear Sir.

I asked Collins[18] to send Proof of Dr. Morris Catalogue[19] to you. Please look over completely and report to me as soon as possible any correction or suggestions.

Dr. M. has just sent a mss of compilation of all descriptions of day butterflies.[20]

Yours truly
S. F. Baird

W. H. Edwards
Newburgh

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[15] Among these may have been the *Melitaea nycteis* Doubleday described by Edwards from specimens taken in Illinois in his first series of descriptions (Proc. Acad. Nat. Sci., Phila., pp. 160–164, 1861.)

[16] There were two Fort Massachusetts occupied by the U. S. Army in the late 1850s. One of these was situated on an island off Gulfport, Mississippi. The other in the Upper Rio Grande valley. Baird refers to the latter. The fort preceded Fort Garland in the San Luis Valley, Colorado. It was situated on Ute Creek near the forks in the foothills at the eastern edge of the valley. Hume (1942), p. 359, was incorrect when he stated that the only known picture of the fort is in DeWitt Clinton Peter's "Kit Carson's Life and Adventures, etc. etc." published in 1874 by Dustin, Gilman & Co., Hartford, Connecticut. Two other pictures are known to me, one by Kern in the Pacific Rail Road Surveys and the other by an unknown Signal Corps artist.

[17] Cantonment Burgwyn was situated in New Mexico. The following excerpt from the diary of "James A. Bennett: A Dragoon in New Mexico, 1850–1856." (Brooks, Clinton E. and Frank D. Reeves, NEW MEXICO HISTORICAL REVIEW, vol. 22, p. 90, 1947) locates the establishment: "August 7 1852—Passed Las Rincones (The Corners), where a number of mountains appear to come to a point or corner. Scenery very picturesque. Arrived Taos and established our camp 8 miles south of the town in a cañon or gorge of the mountains. This is to be the future site of a fort [Cantonment Burgwyn] which we have come to build. Surrounded by mountains, it looks as though we were shut out from the world."

[18] T. K. Collins was the printer in Philadelphia who at this time did much printing for the Smithsonian.

[19] John Goodlove Morris [Johann Gottlieb Moritz] (1803–1895) *A Catalogue of the Described Lepidoptera of North America* accepted for publication by the Smithsonian Institution on October 1, 1859 and issued in May 1860. The origin of this and other similar entomological works of the time may be seen in the following quotation from Baird's report as Assistant Secretary in the Annual Report of the Smithsonian Institution for 1858 on p. 30:

"The greatest deficiency in American Natural History is to be found in the department of Entomology, there being no original treatise in reference

408

Newburgh, New York
7th April 1860

Prof. Baird

Dear Sir.

I received your letter and shortly after the proofs of Dr. Ms. Lepidoptera.[21] The Dr. has sent me the sheets as printed heretofore and I have written him from time to time upon any omissions etc. that occurred to me. I am only acquainted with the Diurnal Species, and the Sphingidae, and so far the Synopsis appears correct. It is a work of / vast labor, and doubtless there are some species omitted, or synonyms of species. But it will be of great assistance to us in our studies of these insects. I hope the Smithsonian will see reasons for publishing the Descriptive Catalogue[22] which Dr. Morris has been engaged upon. That will save a great deal of time trouble and expense in journeying to one place or another to examine some book of difficult access. /

If Mr. Drexler goes to Labrador[23] I hope he will go prepared to preserve his captures (in Lepid.) carefully. The specimens he brought from the west[24] were all damaged from having been improperly cared for after being

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to this country applicable to the wants of the present day. The Institution has therefor made arrangements with eminent entomologists for the preparation of the following series of reports on the different orders . . . Lepidoptera to Dr. J. G. Morris, Baltimore, and Dr. B. Clemens, Easton, Pa."

[20] Morris' *"Synopsis of the Described Lepidoptera of North America. Part I. Diurnal and Crepuscular Lepidoptera* accepted for publication in October 1860 and issued in February 1862. This contains, on pp. 350–351, some notes by W. H. Edwards that have been overlooked by all of his bibliographers.

[21] Morris' "Catalogue," see note 19.

[22] Morris' "Synopsis," see note 20.

[23] Edwards seems to have Drexler's destination confused with that of Chadbourne, or he had a vague idea of the geography of northeastern Canada.

[24] No clue to the source of this material is to be found in the Annual Report for 1859. However, in the report for the previous year there is on p. 60: *"Drexler, C.*—Collection of vertebrates from Fort Bridger. Living *Spermophilus townsendi* and *Cynomys gunnisoni."* During 1858 Drexler was assistant to Cooper, the ornithologist, while engaged with the Department of Interior on the Wagon-road through South Pass, Wyoming, under the direction of William M. Magraw. Cooper, the surgeon-naturalist, returned to Washington, D. C., from Fort Laramie, Wyoming, before the party settled into quarters in the Wind River country for the winter of 1858–59. In March Drexler and Magraw moved to Camp Scott near Fort Bridger and remained until June during which time he collected in the general vicinity. Drexler seems to have been engaged to collect birds and mammals, thus any insects he took were his own to dispose as he saw fit.

taken. He ought to put each specimen in a folded paper by itself, and then carry them in a box—not in his pocket book as he did in the West—whereby the antennae and legs were all broken. Enjoin this upon him.

Yours truly
W. H. Edwards

461

April ?? 60

My Dear Sir.

As it will be necessary to start Drexler off in about a week, I would be glad if you have the money to spare to add to the limited funds the amt. you proposed to give him (25.00).

Sincerely yours
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

The letter number and the date on the "press" of this letter in the copy-book is so blurred that neither can be read with certainty. The number of the letter impressed with this one Copy-book p. 461 seems to be 1010 and the date of it is either April 14 or 16, 1860.

409

Newburgh, New York
17th April 1860

Prof. Baird
Smithsonian Ins.
Washington
Dear Sir.

I enclose $25. in check for subscription to Drexler's expedition. I hope you have enjoined on him great care in preserving his lepidoptera.

Yours truly
W. H. Edwards

1071 503

April 19 60

My Dear Mr. Edwards.

Your 25.00 for Drexler's trip just received. Much obliged. He promises vast improvement in his work this time.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

1169 578

April 27 60

Dear Sir.

I enclose a note which speaks for itself. Please send to Clemens[25]—Morris when read.

May send a small box of Lepidop. from Nova Scotia.[26]

Drexler left Friday.

Yours
S. F. Baird

W. H. Edwards
Newburgh

1430 62

May 17 60

Dear Sir.

Enclosed is a catalogue of European eggs and Lepidoptera for sale by Dr. Wm. Heneleben[27]

.....*

Ill.

If you want any of the latter, address for terms, etc, as above.

Yours ever
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

410

Newburgh, N. Y.
21st May 1860

[25] James Brackenridge Clemens (1829–1867): physician and entomologist interested in moths, living at the time of this letter in Easton, Pennsylvania. Author of *"Instructions for collecting Lepidoptera"* published as an appendix to the Annual Report of the Smithsonian Institution for 1858, pp. 173–200.

[26] The Annual Report for 1860, p. 84, includes among the donations this note: *"Winston, W. G.*—Lepidoptera and skins and eggs of birds from Halifax." On p. 74 of the report is the notice that Dr. Morris and Mr. Edwards are the entomologists responsible for study of the Smithsonian Lepidoptera. This is the first announcement of an official connection between Edwards and the Institution. It probably was in this official capacity that he received material donated to the Institution. Previous material sent to him by Baird was collections placed with the Institution for sale.

[27] I have not been able to identify Dr. Heneleben. He is not listed in the usual biographical sources nor in either of Carpenter's bibliographies (1945, 1953).

* The town name is undecipherable. Mr. De Atley suggests Galena.

Prof Baird
Dear Sir.

I return the list you sent me. It mentions only European Lepidoptera so far as I discover. I will perhaps write to the gentleman[27a] to learn if he collects in Illinois.

Much obliged to you however for thinking of me.

Yours truly
W. H. Edwards

1474 97

23?
May 26 60

Dear Sir.

I send a few Lepidoptera collected in Jamaica* by Dr. J. B. Smith[28] of New York.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh

411

Newburgh, New York
21st Sept. 1860

Dear Sir.

Do you hear from Kennicott and Drexler and have you received any insects from either that are in my line. Perhaps D. will shortly be home himself.

Yours truly
W. H. Edwards

Prof. S. F. Baird

2354 620

Oct. 3 60

Drexler will be back in a few weeks. I hope he will bring some Lepidoptera. Kennicott will soon be home. . . .*

Yours truly
S. F. Baird

W. H. Edwards
Newburgh

[27a] I have not been able to discover any evidence that Edwards procured material from Heneleben.

* This may be Jamaica. The first letter may be I, J or T the next two clearly are "am", the next three or four letters are anyone's guess! Mr. De Atley agrees that Jamaica is a reasonable reading of the word in question.

[28] This is not John Bernard Smith, the well-known entomologist, who was born in 1858 and died in 1912.

* The last three words are poor transfers and I can make no sense of the last one.

2578 70

Oct. 23 60

Dear Sir.

I send a few Lepidoptera received from Kennicott, etc. More will be here in a few weeks.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

2625 114

Oct. 31 60

Dear Sir.

I send by mail a few Lepidoptera brought by Drexler. His main collections are coming around by London and will be here in a few weeks.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh

412

Newburgh, New York
4th Oct. 1860*
[4th Nov. 1860]

Prof Baird
Dear Sir.

I have been absent from home till yesterday for a month or so. On my return I found two letters from you with two packages. The larger I take to be from Kennicott. Both contain specimens of interest and in good order. I recognize several of the diurnals figd. by Kirby. I shall be in Washington about 15th Dec. and will call on you of course. But if anything for me comes along, send it on as before.

Yours truly
W. H. Edwards

2705 166

Nov. 17 60

Dear Sir.

We have requested Collins to mail you proof of second and all succeeding signatures of Morris' Lepidoptera.[29] Will you not oblige Prof. Henry[30]

* Something is awry here. This letter is misdated by a month. Edwards states he has been away from home "a month or so", yet letter 411 from him to Baird is clearly dated "21st Sept 1860" and this one very clearly "4th Oct. 1860". Baird wrote three letters to Edwards during October 1860, one each on the 3rd, 16th and 31st. The first of these, 2354, answered Edwards letter of September 21st. The other two announced shipment of packages from Kennicott and Drexler respectively. This letter, 412, ob-

and the Institution by looking them over and returning to *us* with any corrections. Due credit will of course be given for such assistance.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

2791 233

Nov. 25 60

My Dear Sir.

For fear something may occur to prevent my seeing you on your return from Virginia I will write a line to thank you for your letter[31] and criticisms on Morris Catalogue. This I have sent the Dr. and hoped it will be of use to him.

The present work does not pretend to be more than a compilation. To the monographic labors of yourself and Clemens we look hereafter for a thoroughly scientific elucidation of the whole subject. In the mean time however you will oblige Prof. Henry and the Institution greatly by helping to correct this book, and perhaps the/ best way will be to revise the sheets one by one carefully, make additions of localities, species, etc. to be inserted in the end as an appendix. A general index will & readily harmonize this with the body of the text. Of course any suggestions or corrections that can be inserted in the first sheets should be so treated.

As to localities, are not many of those referred to by you known only to yourself by specimens in your private collection, and not yet published to the world?

Sincerely yours
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

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viously acknowledges Baird's letters of the 6th and 31st and the packages they announce. The date must be later than October 31.

[29] Morris' "Synopsis," see note 21.

[30] Joseph Henry (1797–1878): physicist, the first Secretary of the Smithsonian Institution to whom Baird was assistant and successor. See DAB 8: 550–553.

[31] The letter referred to here by Baird is missing from his files. Probably it was sent to Morris with the suggestions and corrections included with it or part of it. The information was incorporated by Morris as pp. 350–351 of the "Synopsis" (see note 21) and full credit given to Edwards as its author. Other corrections and suggestions may have been incorporated in the body of the text. The two pages cited may be considered Edwards' minimum contribution to the publication.

413

New York, 40 Wall St.
2 Jan., 1861

Dear Sir.

I am now in the city for the winter and my address will be as above. I have not received from the publishers the first sheet of Dr. Morris' book[32] nor any after the third. I would like the others as they appear and will thank you to order them sent to me here instead of Newburgh. I conclude that Drexler found no more butterflies in his collections[33] just received.

Yours truly
W. H. Edwards

Prof. S. F. Baird
Smithsonian

414

New York 40 Wall St.
Feb. 22 1861

Dear Sir.

I have written a few lines to Kennicott which read and send with your next to him.

You can say to him that I subscribe to his expedition and wish to do so while he is in those regions, and urge him to do what he can for my department.

I will send $50 to you shortly for him.

Dr. Gabb[34] writes me that his Texan expedn. is broken up, for which I am sorry.

Yours truly
W. H. Edwards

Prof. Baird

535 76

March .....*

Dear Sir.

We enclose a letter from Mr. Wm. H. Hall[35] [or, Hale] of Boston asking for certain information which you can probably give him.

[no signature]

Wm. H. Edwards
40 Wall St
New York

[32] Morris' "Synopsis," see note 21.

[33] From Hudsons Bay area.

[34] William Moore Gabb (1839–1878): paleontologist, member of the Academy of Sciences, Philadelphia, and of the Entomological Society of Philadelphia (elected May 12, 1862, with residence in San Francisco, California at that time). In 1861 Gabb was appointed to the Geological Survey of California and thus his proposed expedition to Texas was abandoned. See DAB 7: 81–82.

561 98

March 16 61

My Dear Mr. Edwards.

By hand a box of Lepidoptera just received from Wm. Vuille,[36] Yreka, Cal. (near Shasta Mt.) What are they worth to you and what will you give him for them. He wishes to sell, and will collect others, if things go off right.

A Mr. William Dean[37] of Lambertville (State not mentioned) writes us that he has a large collection of Lepidoptera. Better write him.

I would be glad to have the money for Kennicott as soon as possible as I should before long send him his funds.

Sincerely yours
S. F. Baird

W. H. Edwards
40 Wall St.
N. Y.

415

New York 40 Wall St.
Mar. 26th 1861

Prof Baird
Dear Sir.

Yours of 16th only came this morning, and I have heard nothing of Mr. Vuille's box. Possibly your letter is misdated, but if not and you sent the box as you advised, I had better look it up at the express office here.

I believe Lambertville is near Princeton, New Jersey.

I will send you the money for Kennicott in a few days, probably this week.

Yours truly
W. H. Edwards

424

Newburgh, New York
28th March [1861]*

Prof Baird
Dear Sir.

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* The date cannot be deciphered. On the same leaf of the copy book is a letter to John Cassin, numbered 534 and dated March 14, 1861. This letter may have been prepared for Henry's signature.

[35] I can find no reference to William H. Hall, or Hale, in the biographical sources at my limited disposal.

[36] William Vuille (–): I can find no information about this man.

[37] William Dean (–): I can find no information about this man.

* The lack of year date upon this letter caused it to be bound with Baird's incoming correspondence of 1862. The content, when read with Edwards' letter 415, March 26, 1861 and Baird's letter 711 dated March 29, 1861 accurately places this letter here.

I have written the other letter[38] in such shape that you may send it to Mr. Vuille if you please. I have made him a good offer I think especially as he will send usual species that are of no value as being found in these States.

This lot just recd. is valueless, and you would not think I ought to pay for them in such condition I presume. Mr. V. evidently thought the Sphinges worth something, but every one was common all over the country.

W. H. E.

711 185

March 29 61

My Dear Sir.

Check for 50. was duly received for Kenicott.[39] Very much obliged.

I will send your letter to Vuille. The specimens I sent you were started from Cala. in October.

Of course if the specimens are worth nothing they are not worth anything.

Sincerely yours
S. F. Baird

W. H. Edwards
N. Y.

Let me know if you have not yet had proofs of Synop. of Morris.

416

Hunter, Greene Co., N. Y.
30 Sept. 1861

Prof Baird

Dear Sir.

Have you ever heard from Kennicott, or received anything from him for me or any other of our correspondents? If you have any packages for me, I will try to find some private opportunity of sending them to New York rather than trust to Express. Where is Drexler? If he is at Washington I will write him. I have described eleven / species of Diurnal Lepid in the last number of the Phila. proceedings.[40] Ten of these are new, and

[38] I believe that this letter, 424, was just a note transmitting a letter for Vuille. It is the only one I have come across signed only with Edwards' initials.

[39] No letter of transmittal for this check from Edwards is in Baird's file.

[40] Although the letter clearly states that eleven species were described only ten appear in the article "Descriptions of certain species of DIURNAL LEPIDOPTERA found within the limits of the United States and of British America." (*Proceedings of the Academy of Natural Sciences*, Philadelphia, 1861, pp. 160–164, July number.) This, the first entomological article published by Edwards, describes the following:

1. *Melitaea mylitta* from "Texas, Kansas, California."

   The Texas record probably is in error. The Kansas record is possible, although not referring to Kansas as delimited today. Previous to February 1861 Kansas extended westward to the Conti-

(*continued from page 207*)

nental Divide and *mylitta* is not rare in the canyons west of Denver, Colorado. Sources of the Texas and Kansas specimens need elucidation. The California material probably came from Dr. Hermann H. Behr, of San Francisco.

2. *Melitaea minuta* from "Texas," through J. W. Weidemeyer of New York, a close friend of Edwards.

   Gideon Lincecum sold a large collection of Texan Lepidoptera to George William Peck of New York at this time. It is possible that some of this material found its way to Edwards via Weidemeyer. See Geiser, 1948, pp. 199–214.

3. *Melitaea nycteis* Doubleday, from "Illinois and Missouri."

   See letter to Baird dated 1 March 1860 about naming butterflies for the Illinois Natural History Society.

4. *Limenites weidemeyerii* from "Rocky Mountains" through J. W. Weidemeyer.

   Probably from specimens collected by J. Winslow Howard. See Brown 1957, pp. 45–47.

5. *Satyrus silvestris* from "California," from Dr. H. H. Behr.

   At this time of its history the Smithsonian was very active as a clearing house through which naturalists in this country, and those abroad, too, exchanged material. I am confident that Behr's shipment was passed on to Edwards by Baird but can find no letter to cover the shipment from Baird to Edwards. This may be from the California material mentioned by Edwards in his letter dated Nov. 29, 1859.

6. *Coenonympha inornata,* from "Lake Winnipeg," collected by R. W. Kennicott.

   Kennicott's route on Lake Winnipeg was from Fort Alexander at the head of Travers Bay in the southeastern corner of the Lake to Norway House in the northeast corner of the Lake. It is probable that he collected these specimens in June or early July, 1859, somewhere on the eastern shore of the Lake, most likely at Norway House.

7. *Coenonympha ochracea,* from "Lake Winnipeg, California, Kansas."

   Lake Winnipeg: probably collected by Kennicott in 1857 near Winnipeg among the Red River Settlements (see letter dated Nov. 23, '59) or in 1859—see *inornata*—. California: two possibilities, 1) from H. H. Behr, 2) from one of the various collections made in the Great Basin, known in the '40s and '50s as Upper, or New California —see map published by S. Augustine Mitchell, NE corner of Market & 7th St., Philadelphia, Pennsylvania in 1845—. If the specimen came from what we now know as California it probably was a specimen of *galactinus* or *eryngii,* if from the Great Basin it was properly associated with what we call *ochracea* today. I favor the latter situation. Kansas: from the Rocky Mountains west of Denver, Colorado, possibly collected by Brandt, Howard or Wood. —see Brown 1957, 41–47.

8. *Lycaena anna* from "California," from Dr. H. H. Behr.

9. *Lycaene scudderi,* from "Lake Winnipeg," through S. H. Scudder.

the other one heretofore only figured but not described. I have several others that will be ready soon. I still have your Kirby vol. 4, and will return it in a few weeks.

Direct to me as above. I shall be here till 1st Nov. and then at Newburgh.

Yours truly
Wm. H. Edwards

1582 627

Oct 13 61

My Dear Sir.

I heard from Kennicott to date of January 2.[41] He was then on the Youkon of Russian America. It was too wintery to talk about butterflies. Some collections now on their way are said to contain Lepidoptera.[42]

Drexler is now in Washington I believe.

Sincerely yours
S. F. Baird

W. H. Edwards
Hunter
Greene Co. N. Y.

1824 79

Nov 12 61

Dear Sir.

Are you aware of some descriptions of new Lepidoptera in Canada Naturalist for Feb. 1861.[43]

We have some Lepid. from Slave Lake. Just received from Mr. Ross.[44]

Truly yours
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

Probably from Kennicott's 1857 material collected among the Red River of the North settlements.

10. *Lycaena fuliginosa,* from "California," from H. H. Behr.

[41] This letter is quoted on pages 59–61 of the Annual Report of the Smithsonian Institution for 1861, in Baird's Appendix to the Report of the Secretary.

[42] The only material received from Kennicott in 1861 is reported in the Annual Report for that year on page 66. "Kennicott, Robert.—Zoological specimens, plants, etc, from Great Slave Lake."

[43] Dr. Frederick Rindge of the American Museum of Natural History has checked this article for me. It is in *The Canadian Naturalist and Geologist, and Proceedings of the Natural History Society of Montreal,* volume 5, pp. 36–41. It was written by W. S. M. D'Urban and is entitled "Addenda to the Natural History of the Valley of the River Rouge." In it are descriptions of numerous new species of moths, written by Francis Walker, mostly from Montcalm township. There also are four new names proposed by Walker, without descriptions, assigned to the genus *Boarmia.*

417

Newburgh, New York
Nov. 19th 1861

Prof Baird
Dear Sir.

I did not know of the descriptions in the Canadian Jnl. you mention. I will obtain it if possible.

I will find an opportunity to send to you by [hand] for the lepidoptera you have on hand, in a few days.

Yours truly
W. H. Edwards

418

Newburgh, N. York
Nov. 25th 1861

Prof Baird
Dear Sir.

I dont find the opportunity I expected to send to you by [hand] for the lepidoptera from Slave Lake. As the only objection I have to their coming on by express is the risk of breakage, suppose I send you a box large enough to enclose your box. If as I understand you do not pay freight on packages sent to you, this plan will not increase the expense. You [tell] me the size of box that you have and I will at once forward mine, if it pleases you.

Yours truly
W. H. Edwards

1895 124

Nov. 26 61

My Dear Sir.

We have plenty of boxes, and can pack the smaller boxes of Lepidoptera in larger ones without difficulty. Will do so and send you.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh

419

Newburgh, N. Y.
30th Dec. '61

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[44] Bernard Rogan Ross (1827–1874): Hudsons Bay Company agent at Fort Simpson where Kennicott wintered in 1859–1860. He and his wife, Christina, (*q.v.* note 54) collected butterflies for Edwards at various Hudsons Bay Posts in northern Canada. There is a one-page biographical note by Mrs. J. M. Sherk about Ross in the Hudson's Bay Company magazine THE BEAVER, Dec. 1926, p. 25. See note 49.

Prof Baird.

Dear Sir.

I have a letter from Mr. Saunders[45] of London, C. W. [Ontario] asking the price of the Smithsonian Cat'ge. of Coleoptera[46] and where it can be procured. I wish you wd. give me the information for him.

I shall have several new Lepidoptera (diurnal) to describe in the Feby. Proceedings.[47] Among them a large Argynnis from the north that has been overlooked.

Yours truly
W. H. Edwards

1 212

Jan. 3 61 [62]*

My Dear Sir.

We have none of our Catalogue of Coleoptera now to spare: Leconte's classification[48] costs 1.00.

[45] William Saunders (1835–1914): an apothecary who long lived in London, Ontario, and was an outstanding entomologist, See Carpenter, 1945, p. 90.

[46] Probably refers to "Catalogue of described Coleoptera of United States." Friederich Ernst Melsheimer, revised by S. S. Haldeman and J. L. LeConte. S. I. Publ. No. 62. July, 1853.

[47] "Descriptions of certain species of DIURNAL LEPIDOPTERA found within the limits of the United States and British America. No. 2." *Proceedings of the Academy of Natural Sciences,* Philadelphia, 1862, pp. 54–58, February number. This paper contains the original descriptions of seven new species and re-description of one. The "large Argynnis from the north" is the first mentioned, *atlantis.*

1. *Argynnis atlantis,* from "Catskill Mountains, near Mountain House [N. Y.], Williamstown, Mass., Lake Winnipeg, through S. H. Scudder, Hudson's Bay, collected by C. F. Drexler, north side of Lake Superior, collected by L. Agassiz."
2. *Thecla acadica,* from London, C. W. [Ontario] through Wm. Saunders.
3. *Thecla laeta,* from London, C. W. [Ontario] through Wm. Saunders.
4. *Lycaena neglecta,* from Massachusetts, New York, Wisconsin, Lake Winnipeg.
   [Massachusetts and New York: probably Edward's own captures; Wisconsin: possibly Kennicott material.]
5. *Chionobas taygete* Huebner, from Albany River, Hudson's Bay, collected by C. F. Drexler.
6. *Pamphila verna,* from Illinois through Benj. D. Walsh; and Washington, D. C.
   [Walsh material was in all probability from the vicinity of Rock Island, Illinois; Washington, D. C., material probably supplied by Drexler.]
7. *Pamphila rurea,* from Rock Island, Illinois, through B. D. Walsh.
8. *Hesperia vialis,* from Rock Island, Illinois, and Lake Winnipeg.

We will send in a day or two the lots of Lepidoptera now here and you will receive an official announcement of the same from Prof. Henry. Send back second best series of Mr. Rosses Ft. Simpson[49] Lepidoptera to be sent to Montreal Nat. Hist. Soc.[50] The others are a box of Cubans (five) from Chas. Wright[51] and some eaten up Amazonians of Lt. Herndon[52] also from Kennicott in paper.[53]

Yours truly
S. F. Baird

W. H. Edwards
Newburgh

7 213

[no date]

Dear Sir.

I write to announce the transmission of some boxes of Lepidopterous

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[The Rock Island material from B. D. Walsh; Lake Winnipeg material doubtlessly from Kennicott.]

* Edwards made the usual lapse at the change of year date!

[48] John Lawrence Leconte (1825–1883): probably refers to "Classification of North American Coleoptera" Part 1. 1861. The work was not completed until 1873.

[49] Kennicott had left collecting equipment with the Rosses at Fort Simpson, H. B. T. (Mackenzie Territory today). The post is on an island in the Mackenzie River just below the point where the Liard River joins it from the west, 121° 21′ W. Long., 61° 52′ N. Lat.

[50] These collections are now in the Redpath Museum, McGill University, Montreal, Quebec.

[51] Charles Wright (ca. 1810–1885): botanist, a graduate of Yale, class of 1835, who a few months after graduation moved south and in 1837 settled in Texas. He was a botanist for the United States and Mexican Boundary Survey in 1851–1852 and the North Pacific Exploring Expedition1853–1855. He spent 1856–1857 botanizing in Cuba. From 1868–1876 he was variously employed at Harvard in the Herbarium and Bussey Institute, upon a short expedition to Santo Domingo (1871) and mostly in semi-retirement at his home in Wethersfield, Connecticut, where he died. See Geiser (1948), pp. 172–198.

[52] William Lewis Herdon (1813–1857): naval officer; made a two-year journey across South America from Peru via the Amazon. (1851–1852). He reported his findings to Congress on 26 January 1853. His account was published by the Government in two volumes "Exploration of the Valley of the Amazon" 1853–1854. In true Navy fashion he went down with his ship as it foundered in a storm off Cape Hatteras during the night of 12–13 September, 1857. See DAB 8: 579–580.

[53] In the Annual Report for 1861 on p. 59 Baird remarks that no collections were received during the year from Kennicott except a few gathered in July and August 1860. This was material captured at Fort Resolution on Great Slave Lake, usually referred to as "Slave Lake."

insects received by us within a few weeks past. You will please us to personally under take charge of these specimens holding the first series subject to the order of the Institution and making such disposition of the remainder as may be for the best interest of Science.

We have however, in like case of the specimens furnished by Mrs. Christina Ross[54] to request that you will return the second best series of the specimens to us, labelled, in order that we may forward it to the Montreal Natural History Society, as desired by Mrs. Ross. We will also be pleased to have a list of the species contained in this box in order to send it to Mrs. Ross as an encouragement to further collection.

[no signature]

Wm. H. Edwards
Newburgh
New York

This is Baird's draft of the letter for Prof. Henry's signature mentioned in letter no. 1, dated Jan 3, 62.

60 254

Jan. 13 62

My Dear Sir.

Prof. Henry proposes to have a new edition of the directions for collecting insects.[55] Have you any corrections or additions to suggest? If so send along.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh
Did you get the Lepidoptera?

420

Newburgh, 20th Jan. 1862

Prof. Baird.

I have yours of 13th. I will send a few directions for taking and putting up butterflies herewith.[56] The principle care is lest the specimens be injured by handling, or badly pinned. The box came in good order. I received Prof. Henry's letter about same time, and I will return a series of the Fort

[54] Christina Ross (–): wife of the Hudsons Bay Company official, Bernard R. Ross. (see note 41) She was the daughter of Donald Ross, who was in charge of the Norway House district at the time of the marriage in 1860. Mrs. Ross collected butterflies for Edwards at several posts in the old Hudson Bay Territory.

[55] The first edition of these instructions was published in the Appendix to the Annual Report of The Smithsonian Institution for 1858. The part devoted to "Instructions for Collecting Lepidoptera" is found on pp. 173–200, and was written by Brackinridge (*sic*) Clemens, M. D.

[56] I can find no evidence that Baird ever used this material. Although new instructions for field workers were published for other orders of insects nothing but Clemens' instructions were printed for Lepidoptera, see note 55.

Simpson species as he desires. There was nothing that I had not recd. before, unless perhaps one small Argynnis [*Boloria*], that I am not yet determined about. Mrs. Ross needs instructions badly. Most of the specimens seem to have been roughly handled, and are either broken or the scales are rubbed off. She uses very coarse pins. I would send her pins if I knew how to do it. Her species are mostly those common to our northern states, but there are a few Boreal ones, same as we get from Winnipeg and Slave Lake.

The Cuban species are very good and all named, which is admirable. Cant you get Mr. Wright to send more of them, not the rarities only, but the common ones. These last are the species often common to both *Cuba* and *Florida*.

I doubt very much if I shall be able to send anything to Kennicott this Spring. My monies are unfortunately locked up in Virginia, or owing me by rebels, and I must wait on Uncle Sam's armies.[57]

I am about describing in the Proceedings of Phila./ several more descriptions of butterflies.[58] I am working up the material as fast as I can safely.

[57] This is the first mention of the Civil War in this correspondence although the conflict had been waged some nine months at the time the letter was written. Edwards coal properties in the Kanawha valley were in the "no man's land" created when western Virginia did not join with the Confederate States of America.

[58] "Descriptions of certain species of DIURNAL LEPIDOPTERA found within the limits of the United States and of British America, No. 3.", Proceedings of the Academy of Natural Sciences, Philadelphia, 1862, pp. 221–226, April number. Eight new species and re-descriptions of three others were published at this time.

1. *Argynnis nokomis,* from "Rocky Mountains and Mountains of California."

   The type locality of this species is a moot question. In the original description Edwards states "Rocky Mountains and Mountains of California." Also, "This is much the largest of the Pacific species, equalling the largest specimens of Cybele. In color it most resembles Aphrodite. The female I have not seen."

   This would lead me to believe that Edwards had at least two males before him when he wrote the description. However in his Butterflies of North America, volume 1, Argynnis IV, he states "The original specimen from which the description of the species was drawn was received by me in 1862, through the Smithsonian, and was labelled 'Bitter Root Mountains.' Until the present year (1872) it has been an unique in my collection and, so far as I know, not found in any other." More confusion is added by Edwards in his "Reminiscences" (see dos Passos, 1951, p. 143) where he states about *nokomis* ". . . a single male of which I found at the Smithsonian in a glass jar amid some cotton wool from southern Utah, or southeastern California. . . ."

   The status of *apacheana* Skinner and of *nigrocaerulea* Cockerell

Yours truly
W. H. Edwards

P. S. I have written a few directions which I think cover the whole span, and I suppose the fewer the better. You can alter them or amend as you please as I send the draft as written.

421

Newburgh, New York
30th Jan. 1862

Prof. Baird.

Dear Sir.

I have put up as directed by Prof. Henry a set of the butterflies sent by Mrs. Ross. I think they are not worth sending to Montreal, but it is well enough to oblige the lady and hope for better lot next time. Nearly all of

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depend upon discovery of the true source of the type specimens of *nokomis* Edwards.

2. *Grapta faunus,* from "Catskill Mountains, New York, Fort Simpson, Albany River, Lake Winnipeg."
   Catskill Mountains, N. Y.: probably collected by Edwards himself; Fort Simpson, Mackenzie Territory: collected by either Kennicott or Mrs. Ross, most likely the latter; Albany River, Ontario: collected by C. F. Drexler; Lake Winnipeg, Manitoba: probably collected by Kennicott.
3. *Thecla californica,* from California through H. H. Behr.
4. *Thecla viridis,* from California, through H. H. Behr.
5. *Thecla affinis,* from "Utah collected by Mr. C. Drexler."
   In 1858 Drexler was with the Department of Interior party under William M. Magraw working on the wagon road through South Pass, Wyoming, into Utah. The accession list for this year shows five boxes of vertebrates from Utah collected by Drexler. He probably retained the butterflies for his own collection and exchanged these with Edwards (see note 4) This would place the type locality either in Uinta County, Wyoming, or Summit County, Utah.
6. *Lycaena behrii,* from California through H. H. Behr.
7. *Lycaena pembina,* from Lake Winnipeg collected by R. W. Kennicott.
8. *Lycaena shasta,* from California through H. H. Behr.
9. *Lycaena scudderi* Edwards, description of the female from London, C. W., collected by Wm. Saunders, and from Fort Simpson.
10. *Parnassius smintheus* Doubleday, described from Californian specimens.
    True *smintheus* hails from the vicinity of Banff, Alberta. This description by Edwards refers to the Californian red-spotted form, *sternitzski* McDunnough, not the usual yellow-spotted one, *behrii* Edwards.
11. *Limenites eululia* (sic) Doubleday, described from Californian specimens supplied by H. H. Behr.
    True *eulalia* hails from Mexico. Edwards here described what Butler later called *californica.*

the specimens seem to have been either caught in the hand or much handled, so they are much rubbed. Except three or four species that are Northern the others all are common to our region as well. Some of the commonest she sent in greatest number, e.g. *Vanessa Milberti.* / There were 38 spec. of one little Argynnis [*Boloria*] that is valuable if in good condition but which comes in all the lots from Kennicott.

I could not make good looking specimens of them but have done the best I could.

You had better send Mrs. Ross the directions for preserving and taking these insects. She may hit on something very good, and therefore may as well be requested to catch everything.

I have sent nearly a dozen more descriptions to Phila. for publn.[59]

Yours truly
W. H. Edwards

[P. S.]

I don't know whether you have heard that two gentlemen[60] in New York and myself are publishing privately plates of the North American (Mexican as well as U. S.) figs. of life, quarto form. We have an artist who works cheap and well. Each of us has one set colored and altogether about 100 impressions uncolored are taken from the stone. We have published eight sheets with about 40 figures. Many of these insects never have been figured and others badly. We have most of the species in one or other of our collections, and the drawings are from the object itself. I mention all this to show you on one/stone.

I have had several of the new species of Diurnals described by me figured, and I enclose one to show how it looks.

W. H. E.

These two pages are back to back and look as though they were written at the same time as letter 421 of 30 Jan. 1862. If marked as a postscript to that letter the indication has been covered during binding of the letters into the 1862 letterbook. Since Baird's letter of Feb. 2, '62, immediately following, refers to this note I assume it was enclosed with Edwards' letter 421.

157 308

Feb. 2, 62

My Dear Sir.

The box of insects came to hand yesterday in fine condition.

Suppose you address a letter to Mrs. Ross about collecting Lepidopt.

Do you know a work by Lederer on the European Noctuines including Labrador species?[61]

[59] See note 58.

[60] The gentlemen referred to were John William Weidemeyer (1819–?) and Stephen H. Calverly (–), well known Brooklyn, N. Y., entomologists. See dos Passos, (1951), p. 139.

[61] Julius Lederer (1821–1870): "Die Noctuinen Europas" 252 pp. 4 pl. 1857.

If you have done with my copy of Kirby, please return as Ulke[62] and Osten-Sachen[63] wish to refer to it.

I had not heard of your undertaking relative to Lepidopterous plates. I don't think the execution of the sample is very / extraordinary: though perhaps correct. Why don't you put more figures on a plate, and thus save on cost of printing?

Why not try an publish a larger edition . . .* Perhaps Prof. Henry would lend some aid. At any rate I think he would take a colored copy to keep here for reference.

What does the drawing cost per figure? You might make it a series of Smithsonian illustrations of Lepidoptera: we to publish only plain copies and by distributing them create a demand for colored ones to be furnished by some one to his profit.

Sincerely yours
S. F. Baird

W. H. Edwards
Newburgh
Do you keep the stones of your plates?

422

Newburgh, New York
Feby. 5 1862

Prof. Baird.

Dear Sir.

I have yours of 2nd and tomorrow shall send by express your Kirby, for which I am much obliged to you. I have had frequent occasion to refer to it lately. I also send with it 8 sheets of the Sphingidae, for *yourself*. I will see that you get the others when published. The coloring costs 50 cents a sheet, and is very well done indeed. I have had but one set colored. In every instance it is done from the specimen, when that can be obtained. I also send a sheet of the Theclas colored. Perhaps you will not think the coloring extraordinary (as you say of the lithographing, [)] but as I did it / *myself* you must not be critical. This plate and one other same size lithographed, two colored copies of each, and 25 uncolored, cost me $4.50.

The Sphingidae cost $4 per plate to lithograph, and 50 cents each to color. We each had one colored plate made, and in all have struck off 100 copies, after which the stone has been cleaned. It was not our intention to make

[62] Henry Ulke (1821–1910): a portrait painter who was also an entomologist. He was one of the men selected by Baird to handle Smithsonian material on the same basis as Edwards. His field was coleoptera. His fine portrait of Baird hangs in the secretary's office at the Smithsonian Institution.

[63] Charles Robert Osten-Sacken, (Karl Robert Romanovich, Baron von der Osten Sacken) (1828–1906) one-time Russian Consul at San Francisco and outstanding dipterist who worked up much of the material in the Smithsonian Institution at the time of this letter.

* I cannot decipher this word.

a book to be sold, for no bookseller would have treated with us on reasonable terms, but dividing the expense between three, it does not cost a great deal, and we mean to distribute the plates when done. There will be some short text with the plates. Several of these Sphinges have never been figured before, and three that / have been colored by the job, which we will not allow.

I had the small sheets made at my single expense, and of a size to bind into my Boisduval.[64] If the whole can be squeezed to pay me any money, I mean to continue printing off all the new species, at least of Butterflies.[65]

I will write to Mr. Weidemeyer about Lederer. I don't know it.

I will write to Mrs. Ross and send you the letter to be forwarded. I will send her a net and pins also if you think she can receive them. They would have to go by private hand I suppose.

Yours truly
W. H. Edwards

197 341

Feb. 8 62

My Dear Mr. Edwards.

The package with Kirby and the plates of Sphingidae was duly received today. I am much obliged for the latter and shall prize them highly.

Would you have a set colored for the Smithsonian if Prof. Henry will pay for it. It would be very well to have one copy here for reference.

The price you pay for the lithographing is certainly very low.

By all means send the net and pins for Mrs. Ross. We can readily forward them. If you could send a nice book of insects it would be of service in stimulating her efforts.

Sincerely yours
S. F. Baird

W. H. Edwards
Newburgh
in left margin
How many impressions can be struck off from one of the stones?

423

Newburgh, New York
March 17, 1862

Prof. Baird
Smithsonian Ins
Washington, D. C.
Dear Sir.

[64] Jean Baptiste Alphonse Dechauffour de Boisduval (1799–1879): A physician in Paris and one of the outstanding lepidopterists of all times. Edwards probably refers here to "Histoire Naturelle des Insectes. Species general des Lepidopteres. Tome premier. Roret, Paris. 1836." He may refer to Boisduval and Leconte (Major John Eatton Leconte, 1784–1860) "Histoire generale et iconographique des Lepidopteres et des Chenilles de l'Amerique septentrionale." Paris. 1833.

I enclose a letter which you may read for Mrs. Ross. I will send the box tomorrow or next day by express. The book is Rennie's Insect Architecture,[66] a fine copy.

I will see that the Smithsonian gets the Sphinges. It will be three months or more before we have all the sheets issued, after that one artist can have time to color extra plates.

Yours truly
W. H. Edwards

[on reverse]
The box is carefully packed and covered with canvass. This directed to you with my name on the corner. I think you may venture to ford. it to Mrs. R. without opening it & send the letter by mail.
I have a third paper on Butterflies ready for the Phila. Proceedings.[67] No. 2 is now in press. I have described about 24 new species.

425

Newburgh, New York
Apl. 27, 1862

Prof. Baird.

Dear Sir.

I have a letter from a correspondent in Bahia, Brazil, asking me to obtain for him at the Smithsonian "Directions for Meteorological Observations,"[68] "and some other of their interesting papers." What this last means I don't know, but as the gentleman is a naturalist and an educated man, it is well to send him whatever may be likely to interest him. His name is Sr. Antonio de Lacerda,[69] and / his father is one of the wealthiest citizens of Bahia.

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[65] This seems to be the beginning of an idea with Edwards that led to the publication of his monumental "The Butterflies of North America."

[66] This book is number 14 in "The Library of Entertaining Knowledge" published by Charles Knight, London, in 1830, 420 pp. Miss Hazel Gay, librarian for the American Museum of Natural History, New York, supplied me with this information and told me that the title page carries no author's name. On their copy they have written in the author's name.

[67] See note 53.

[68] "Directions for Meteorological Observations and the Registry of Periodical Phenomena" Publ. No. 148. Miscellaneous Collections 1. 72 pp.; x 8 vo., 1860. Probably written by Joseph Henry and Arnold Guyot.

[69] Antonio de Lacerda (–): Through the good offices of Sr. Maury Gurgel Valente, Secretary in Charge of Cultural Affairs of the Brazilian Embassy in Washington, D. C., I was put in communication with Dr. Alvaro Barcelos Fagundes, Conselho de Desinvolvimento, Rio de Janeiro who wrote me as follows: "It is likely that the person to whom the great naturalist was asking the Secretary of the Smithsonian Institution to send some scientific papers was Comendador Antonia de Lacerda, son of the Visconde de Lacerda.

"Father and son were associated in the "Companhia de Vehiculos Economicos," devoted to public transportation in Bahia.

This gentleman was educated in this country and was made known to me by Mr. Thomas Say.[70]

Send me whatever you can for him and I will forward them.

Yours truly
W. H. Edwards

692 687

May 3 62

Dear Sir.

I will have the pamphlet wanted by Senor Lacerda sent you soon.

Please ask him to collect reptiles for us in alcohol. We will send him plenty of books in return.

Truly yours
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

426

Newburgh, New York
6 Oct. 1862

Prof. Baird.
Smithsonian Ins.
Dear Sir.

You wrote me in May that you would send for Mr. Lacerda, of Bahia, the "Directions for Meteorological Observations." He also added "and some other of their interesting papers." I had forgotten the matter till last week when I recd. a notification that a vessel was abt. sailing from Boston for Bahia and the Captain wd. take charge of anything for Mr. L. I got

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"At the time the letter was written (1862) the son, Comendador Antonio de Lacerda, was probably studying the construction of the elevator which connects the upper and lower town in Salvador.

"Although not a technical graduate, he conceived the idea of drilling a shaft through the rock for the location of the elevator. The civil engineers of the time believed it would not be possible to follow this plan. They advocated an external construction involving a tower near the cliff and a bridge connecting it to the plateau.

". . . Mr. Lacerda went ahead with his project, the construction was started in 1869. . . . It is interesting to observe that in 1930, when the capacity of the old elevator had to be increased, the American company in charge of work developed the project along both conceptions. Thus, the present "Elevador Lacerda" consists of two units, a shaft in the rock and a tower, connected by a bridge on the top and a tunnel at the base.

"The information I am transmitting to you has been given by Dr. Pericles Madureira de Pinho, a scholar deeply devoted to the history of Bahia."

[70] Thomas Say (1787–1834): The Father of American Entomology. See Weiss, H. B. and Grace M. Ziegler "Thomas Say, Early American Naturalist." 260 pp. Baltimore, 1931.

this too late to apply to you. / But there may be another opportunity some day and we should be ready. Do send on therefore something for him.

What news from Kennicott?

Our plates of Sphinges have reached no. 15 and there are two more to issue. They make a beautiful series.

Yours truly
W. H. Edwards

427

Newburgh, New York
15th Oct. 1862

Prof. Baird.

Dear Sir.

I wrote you a few days ago about the books for Mr. Lacerda of Bahia. Since I wrote I have been notified that the vessel that was to have sailed on 1st inst. did not get off, and is now expected to leave 1st Nov. So that we can send the things to Mr. L. You desired me to write to him to send you Reptiles and some other things. This doubtless he will do, and if you like to, / add to the books "astronomical observations"[71] he wants anything on these other subjects. He may be able to make good use of them.

Yours truly
W. H. Edwards

1417 [?] 261

Oct. 18 62

My Dear Sir:

Yours of Oct. 6 came to hand as I returned from the north[72] and that of 15th is now here. I gladly avail myself of the opportunity to send a few things under frank.[73] Which please forward.

No news from Kennicott as the Indians got all our letters. No damage to collections I believe. He will probably be back this winter.[74]

Truly yours
S. F. Baird

W. H. Edwards
Newburgh
N. Y.

[71] At this time the Smithsonian was publishing as part of the Annual Report a summary of astronomical observations.

[72] Baird often spent his summers in the Adirondacks or northern New England.

[73] Free carriage of mail accorded to the Smithsonian Institution as a government agency.

[74] Kennicott reached Chicago in October, 1862, the time these letters were being exchanged.

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Newburgh, New York
Oct. 27, 1862

Prof. S. F. Baird

Dear Sir.

The package for Mr. Lacerda came today, as well as a Report[75] to myself, for which I am obliged to you. I shall forward Mr. L's at once to Boston. They will be likely to please him.

I shall be in New York for the winter after November, of which I will duly advise you.

Yours truly
W. H. Edwards

429

Newburgh, New York
24th Nov. 1862

Prof. Baird.

Dear Sir.

I heard this morning from my horticultural neighbor, Chas. Downing,[76] that Kennicott had returned and was at Washington, which I am glad to hear. Give him my regards. I hope he has something good in my department. I go to New York for the winter this week, and hereafter my address will be at 40 Wall St. / as formerly. Send me any package to that direction.

Yours truly X
W. H. Edwards

[75] Edwards probably refers here to receiving a copy of the 1861 Annual Report of the Smithsonian Institution.

[76] Charles Downing (1802–1885): Pomologist and horticulturist living at Newburgh, New York. Not as well known as his younger brother Andrew Jackson Downing (1815–1852) whom he helped write "The Fruits and Fruit Trees of America" published in 1845. DAB 5: 418.

(*continued from page 190*)

A lively discussion period followed and the meeting was adjourned at 9:30 P.M.

EDWARD S. HODGSON, *Secretary*

MEETING OF FEBRUARY 19, 1957

A regular meeting of the Society was held at the American Museum of Natural History; President Treat presiding. Fifteen members and eight guests were present.

The Society voted unanimously to send a letter of greetings and moral support to Dr. and Mrs. Roman Vishniac.

President Treat read correspondence between himself and Mr. J. E. Hunsberger, who had applied for membership in the Society. The members present unanimously passed a resolution to suspend the provisions of the

By-laws regarding elections, and to postpone consideration of Mr. Hunsberger's application for membership at this time.

Dr. T. C. Schneirla of the American Museum of Natural History spoke on "Studies of Army Ants in Arizona". He briefly reviewed the basic pattern of nomadic and statary phases in the activities of *Eciton* in the tropics, and then raised the question of how such an activity pattern would be modified by the different climatic condition of a more northern area.

This matter was investigated by studying the behavior of army ants of the genus *Neivamyrmex* at the Southwest Research Station in Arizona. *Neivamyrmex* raids at dusk and emigration is the sequel of a raid, although the emigration may be carried out in two stages and not actually concluded until the second night. *Neivamyrmex* also has nomadic and statary phases, and the brood conditions "energizing" the raid are similar to those in *Eciton.* The larvae of *Neivamyrmex,* however, are not enclosed in cocoons and the stimuli from the larvae (probably chemical) keep the emigrations going longer than is true of *Eciton.*

The winter causes modifications of the behavioral pattern which had been previously observed in *Eciton.* As the summer season progresses, the phases of the activity cycle may get longer. At the particular locality of the study, a correlation was noted between the onset of cold weather and a reduction of colony activity. In the fall, the queen of *Neivamyrmex* lays small broods and then ceases reproductive functions completely. The colonies go more deeply into the ground in the fall and make only small raids during occasional warmer days of winter.

Dr. Schneirla illustrated his talk with a beautiful group of kodachromes of the Southwestern Research Station and the army ants themselves.

Discussion of Dr. Schneirla's observations continued until 10:00 P.M., when the meeting was adjourned.

EDWARD S. HODGSON, *Secretary*

MEETING OF MARCH 3, 1957

A regular meeting of the Society was held at the American Museum of Natural History; Dr. Treat presiding. Seven members and eight guests were present.

The members voted to approve the appointments to the publications committee suggested by the Executive Committee.

Dr. Daniel Ludwig of Fordham University, spoke on "Effects of temperature and parental age on the life cycle of the mealworm beetle."

Studies on the effects of aging on the progeny of invertebrate animals were initiated with work of Jennings and Lynch on rotifers. The reproductive capacity of rotifers depends upon the age of the mother giving rise to the generation being tested. Dr. Ludwig's work is an attempt to interpret similar results obtained with the mealworm *Tenebrio* in terms of differences in enzymatic activity. *Tenebrio* can be reared conveniently in the laboratory, the number of moults depending on the temperature. It was found that larvae from young parents reared at 30 degrees had a longer larval period than larvae from old parents reared at the same temperature. The adults also lived longer if from young parents.

Attempts are being made to relate these data to the level of cytochrome oxidase activity in the immature stages, since it is known that activity of this enzyme differs in the immature stages of Japanese beetles, depending upon the age of the parents. With *Tenebrio*, beginning at about 5 weeks of age, the cytochrome oxidase diminishes in the egg; the precise significance of this change is not known at the present time.

The meeting was adjourned at 9:30 P.M.

EDWARD S. HODGSON, *Secretary*

MEETING OF MARCH 19, 1957

A regular meeting of the Society was held at the American Museum of Natural History and was called to order at 8:00 P.M. by President Treat.

Mr. Nicholas Shoumatoff and Dr. John B. Schmitt were proposed for membership. The members voted to suspend the bylaws in order to elect these candidates at this meeting, and they were elected unanimously.

President Treat reported that the Society has found its purpose embodied in a certificate of incorporation. This purpose is to "advance the science of entomology in all its branches."

Dr. Ruckes called attention to the damage recently suffered by the Budapest Museum and the loss of the Coleoptera and part of the Hemiptera collections. Funds to aid the Museum are soon to be sought in this country.

Dr. William Creighton spoke on "Studies on Arboreal Ants in Deserts." Contrary to general opinion, there exists a varied fauna of ants in deserts, and among these ants he looked for peculiarities general to several genera found in the Southwestern United States, the object being to find common features produced by convergent evolution influenced by the selective factors in deserts.

He compared ground-dwelling, desert arboreal, and ordinary arboreal ants, with respect to seven general characteristics, including behavioral adjustments to temperature, possession or absence of psammophores, use of soil or plants as nest sites, storage of food, aestivation, marriage flights, diurnal and nocturnal foraging cycles. He presented evidence that most of these aspects of the natural history of ants are influenced by the special selective factors operative in arboreal desert environments. Certain data were tentatively interpreted as indicating that some arboreal ants eat exudates of trees at night. Dr. Creighton's presentation was illustrated by a series of beautiful kodachromes showing the study areas in the Southwest.

After a lively discussion period the meeting was adjourned at 9:40 P.M.

EDWARD S. HODGSON, *Secretary*

MEETING OF APRIL 2, 1957

A regular meeting of the Society was called to order by President Treat at the American Museum of Natural History. In the absence of the Secretary the minutes of the previous meeting were not read. Eleven members and three guests were present. The report of the Field Committee, Mrs. Hopf, Chairman, was read *in absentia*. A field trip to the Audubon sanctuary

near Greenwich, Connecticut, is proposed for Saturday, May 18th, to be conducted by Dr. A. B. Klots.

Assistant Secretary Robert G. Bloch introduced the speaker of the evening, Dr. Ralph E. Heal, Executive Secretary of the National Pest Control Association, who spoke on *Changing Patterns in Insect Control.* The organization represented by Dr. Heal is concerned primarily with "structural pests," chiefly insects and other arthropods in or around dwelling houses or other buildings occupied by man. Conventional ways of dealing with these pests are undergoing rapid change as the result of two main factors: (1) resistance of the pests to insecticides, and (2) prevalent practices in the location and construction of dwelling houses.

Resistance to insecticides, though reported by Melander in 1914 for the San Jose scale insect, did not become a serious problem until 1947, when in Italy and Sweden it appeared that house flies had acquired resistance to DDT. Resistant houseflies were found in the United States in the following year by George Barber of Rutgers University. Resistance of houseflies to the chlorinated hydrocarbons is now world-wide. The organic phosphate insecticides, used as bait components, were intensively tested in Public Health Service projects near Savannah, Georgia, and Orlando, Florida. In these areas a phenomenon which may be described as "behavioral resistance" has appeared in the fly populations, the insects showing an ability to recognize and avoid the poisoned baits. Such resistance is now reported by Dr. Philip Spear in house flies in Illinois. Drastic fly eradication programs in Corpus Christi, Texas, following epidemics of poliomyelitis and infant diarrhoea, has led to the development of highly resistant German cockroaches in that area. Similar resistance is evident in New York City roaches, doubling the cost of control measures. Certain other pests show similar trends, notably the bedbug and the brown dog tick.

Building practices which are bringing new problems in pest control include the increasing use of "hermetically sealed" air-conditioning, the location of new developments in areas with high populations of native insects, and the use of substandard lumber. The virtual sealing of air-conditioned houses often results in the trapping of moisture in walls and woodwork. This favors fungus growth and with it such insects as springtails, silverfish, psocids, and fungus beetles. Clover mites, millepedes, and termites become troublesome where new housing developments arise in areas already heavily populated with these animals. Concrete slab foundations in lieu of basements favor the invasion of houses and make control difficult. Inadequate seasoning of lumber and incomplete removal of the bark leads to infestations of more or less harmless but annoying insects such as bark beetles and cerambycids, for which remedies are not readily available.

Discussion of Dr. Heal's paper centered chiefly about the biological mechanism of resistance and problems of pest control in government housing. The meeting was adjourned at 9:45 P.M.

ASHER E. TREAT, *Secretary* pro tem.

MEETING OF APRIL 16, 1957

A regular meeting of the Society was called to order by President Treat at 8:00 P.M. in room 129 of the American Museum of Natural History.

The speaker of the evening, Dr. Leland G. Merrill, of Rutgers University spoke on "Some Little Known Insect Pests of New Jersey." The State of New Jersey has a 200 million dollar agricultural enterprise with an extremely high valuation of its agricultural land, leading to very serious conditions from insect pests that might be minor pests elswhere. Some insects are also more or less peculiar to New Jersey because of the intensive agriculture there.

Dr. Merrill discussed and showed kodachrome slides of a large number of the New Jersey pests, beginning with the pepper maggot, the European corn borer and the carrot weevil. The corn borer has increased rapidly in the last year and transferred to tomatoes from corn or weeds in New Jersey. The sharp-nosed leaf hopper, found on cultivated blueberries has been indicated as the carrier of the virus disease "blueberry stunt." The cherry fruit-worm and the blueberry crown-girdler also attack cultivated blueberries in New Jersey. The pea aphid develops enormous populations on alfalfa, the principal component of the hay industry in the state. It has been calculated that 4,083 pounds of aphids (wet weight) may exist on a single acre of alfalfa.

Dr. Merrill described the procedure used to alert the growers to new pests, and the methods used to check on potentialities of new insect depredations in the State.

The meeting was adjourned at 9:40 P.M. after the discussion period.

EDWARD S. HODGSON, *Secretary*

MEETING OF MAY 7, 1957

A regular meeting of the Society was held at the American Museum of Natural History, President Treat presiding.

The Society welcomed back Dr. and Mrs. Vishniac after their unfortunate and enforced absence. Dr. Treat expressed the sentiments of the entire Society in telling them how glad we were to see them.

Miss Campbell was proposed for membership, the by-laws being then suspended so that she could be elected to membership immediately.

Dr. Treat called attention to a new book published in France by our member, Dr. Klots, with excellent illustrations of butterflies done by Klots and some by our honorary member, Mrs. Swain. An English edition is expected in about one month.

Dr. Edward Hodgson, of Columbia University, spoke on "The Sensory World of Insects," centering his discussion on the electrophysiological methods of understanding the basis for insect behavior. By recording the nerve impulses orignating in chemoreceptor cells, it is possible to show that many receptor organs of insects have mechanisms for discriminating between "acceptable" and "unacceptable" stimuli. Chemicals activating one cell of a receptor lead to a feeding or positive response, while activation of another cell of the same receptor organ mediates a rejection or negative response. The insects seem to conform in this way to a general situation prevailing among arthropods in which they integrate information in peripheral sense organs, rather than in the central nervous system, as with vertebrates.

The sensory physiology of arthropods occurring in caves was studied, because the lack of visual stimuli in such environments leads to hypertrophy of chemical and tactile senses. It was found that the receptor cells, particularly of cave species, exhibited a great deal of "spontaneous" activity, as would be expected for very sensitive receptors, and the "message" sent to the central nervous system consists of a change in the pattern of nerve impulses, rather than the mere presence of nerve impulses from the receptor cells. Kodachromes showing the cave collecting areas were shown.

After a period of discussion, the meeting adjourned at 10:00 P.M.

EDWARD S. HODGSON, *Secretary*

MEETING OF MAY 21, 1957

A regular meeting of the Society was held at the American Museum of Natural History; Dr. Treat presiding. Twenty-six persons were present.

The Society voted that a letter be sent to Charles Mohr of the Audubon Nature Camp, expressing thanks for his hospitality during the field trip to the Audubon Reservation. The field trip was judged to have been highly successful by everyone who attended.

Dr. Treat announced, with regrets, the resignations of Dr. Creighton as Vice-President, and Dr. Hodgson as Secretary. Both resignations have been necessitated by the pressure of other obligations.

The major part of the evening was devoted to a members' symposium. Dr. Treat reported on the Creighton's arduous trip to Mexico. Dr. Clausen reported on the "good old days" of the Society, with many humorous instances of field trips and meetings which she discovered during a recent search through the old minutes of the Society.

Dr. Vishniac reported that he is starting his photographic work again. Mr. Heineman described some recent collecting adventures in Jamaica. Mr. Soraci described the troubles associated with administration of the gypsy moth control program in New Jersey.

The meeting was formally adjourned at 9:20 P.M., but exchanges of information and other discussion continued long after formal adjournment.

EDWARD S. HODGSON, *Secretary*